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THE VARIABILITY OF ENGINEERING EARNINGS[1]

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1. Variations in Earnings between Engineering Firms

(*i*) *Introductory account of the data*

When the Engineering and Allied Employers' National Federation conduct their periodic earnings enquiries, they ask every one of their four thousand or so member firms to supply (for timeworkers and pieceworkers separately in each of nine specified occupations) totals of workers employed, of hours worked, and of earnings, in a particular specimen week. From these totals are derived the national averages used in negotiations with the unions and, incidentally, the district and sectional figures to which our previous analyses have been confined. However, the Federation have now been kind enough to copy for us, at our request, the original figures for separate firms from one of their enquiries—that of May 1952. The details for which we asked relate to timeworkers and to pieceworkers in the two primary occupations of the wage structure, fitters and labourers; and, while the identities of the employing firms were naturally not revealed, these firms were classified for us by district, by section of industry, and by total numbers employed at the beginning of 1952. Data of this type and on this scale have not hitherto been made available for research purposes; and the present material, apart from its considerable intrinsic interest, enables us to carry our analysis of earnings in engineering a stage further. (The Federation are, of course, in no way responsible for the use we have made of the data they have so generously provided. In particular, the conclusions and suggestions in the second part of the article represent the personal opinions of the authors.)

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[1] This article is the latest of a series on wages (*cf.*, in particular, *The Structure of Engineering Earnings*, Bulletin, September–October 1954).

The firms in question employ in all about 1½ million workers, of whom over 200,000 are in the two occupations considered. As the necessary background to our analysis, we show in Tables I to III how the firms are distributed by size, by district and section of industry, and by the extent of payment by results.

TABLE I

Size Distribution of Federated Firms[1]

Size-group (total numbers employed)	*Firms*[2]		*Employees*	
	number	*per cent*	*number*	*per cent*
1— 49	1,222	*32.3*	31,905	*2.4*
50— 99	697	*18.4*	50,154	*3.8*
100— 149	390	*10.3*	47,748	*3.7*
150— 199	243	*6.4*	41,861	*3.2*
200— 249	173	*4.6*	38,548	*3.0*
250— 299	127	*3.4*	35,162	*2.7*
300— 399	212	*5.6*	72,741	*5.6*
400— 499	127	*3.4*	56,703	*4.4*
500— 599	98	*2.6*	54,031	*4.1*
600— 799	128	*3.4*	89,210	*6.8*
800— 999	80	*2.1*	71,849	*5.5*
1,000—1,999	171	*4.5*	237,484	*18.2*
2,000—2,999	51	*1.3*	123,087	*9.4*
3,000—3,999	21	*0.6*	72,518	*5.6*
4,000—4,999	23	*0.6*	103,435	*7.9*
5,000 and over	23	*0.6*	176,335	*13.5*
All sizes	3,786	*100*	1,302,771	*100*

[1] As at January 1952.

[2] In addition to the 3,786 firms in the table, there were 331 others for which total employment was not known.

The distribution of firms by size is of course highly skewed (Table I). Thus, although just over half the firms employ fewer than 100 workers apiece, these firms account for only a sixteenth of total employment ; whereas the top 2 per cent of firms account for over a quarter. Table II shows the geographical distribution of firms in the different branches of the industry. The main features of this distribution are fairly well-known, and we have already had occasion to comment on them in a previous article.[1] It may, however, not be realised that the Lancashire and Cheshire region is comparable in importance as an engineering centre with London and the West Midlands and, indeed, appears to be rather more diversified than either. Together, these three areas contain about half the firms in the industry.

[1] *Cf. op. cit.* The geographical distribution of employment, however, may not correspond exactly with that of firms, because of the very great variation in firm-size just noted.

TABLE II

Distribution of Federated Firms by Region and Section of Industry

Region[1]	*Agri-cultural mach.*	*Air-craft*	*Con-structional eng.*	*Elec-trical eng.*	*Foun-dries*	*Genl. eng. heavy*	*Genl. eng. light*	*Ma-chine tools*	*Mar-ine eng.*	*Motor cars and cycles*	*Com-mercial vehi-cles*	*Tex-tile mach.*	*Mis-cella-neous*	*All sections*
Western	4	9	15	30	31	4	182	2	—	10	—	—	49	336
Southern	5	12	4	16	11	—	106	2	—	7	7	—	29	199
London	1	30	38	79	22	8	394	14	—	20	4	—	179	789
West Midlands	3	5	25	32	68	8	282	17	—	51	9	1	183	684
East Midlands	2	5	14	17	38	13	159	9	—	4	—	2	50	313
Eastern	8	3	2	7	5	11	46	2	2	1	1	—	20	108
Lancs. and Cheshire ...	3	6	33	51	55	21	290	19	10	5	8	63	158	722
Yorkshire	3	1	16	13	36	11	180	22	3	4	1	31	82	403
North-West Coast	—	—	1	1	2	2	7	—	—	—	—	—	2	15
North-East Coast	—	1	13	15	24	7	51	3	16	—	—	1	41	172
Scotland	3	2	21	26	47	11	110	5	31	1	1	5	72	335
Northern Ireland	—	1	—	3	4	—	17	—	1	—	—	7	8	41
All regions	32	75	182	290	343	96	1,824	95	63	103	31	110	873	4,117

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[1] These regions are defined in Appendix D of *The Structure of Engineering Earnings.*

TABLE III

Distribution of Firms according to the Numbers of their Timeworking and Pieceworking Fitters

Number of timeworking fitters	*Number of pieceworking fitters* *none*	1–5	6–10	11–20	21–30	31–40	41–50	51–70	71–100	101–150	151 *and over*	*Total*
None	[1]	**91**	**64**	**70**	**56**	**29**	**23**	**24**	**20**	**22**	**38**	**437**
1— 5... ...	**606**	55	28	34	13	25	14	6	8	6	8	803
6— 10... ...	**280**	25	16	22	17	10	7	7	3	3	3	393
11— 20... ...	**298**	20	11	20	6	7	8	8	9	13	8	408
21— 30... ...	**124**	7	6	4	5	5	7	8	1	5	9	181
31— 40... ...	**63**	5	3	4	2	3	1	4	6	3	5	99
41— 50... ...	**40**	1	—	—	3	1	—	2	2	1	6	56
51— 70... ...	**46**	3	1	4	—	—	3	3	3	3	8	74
71—100... ...	**25**	3	—	1	1	—	—	1	2	—	5	38
101—150... ...	**17**	2	1	1	1	1	—	3	2	3	9	40
151 and over ...	**10**	—	—	—	—	1	—	1	—	1	13	26
Total	**1,509**	212	130	160	104	82	63	67	56	60	112	2,555

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[1] In addition to the 2,555 firms in this table, there were 1,562 for which we have no returns concerning fitters.

Table III illustrates the extent of piecework, although it relates only to fitters since most of our analysis will be based on the earnings of workers in this occupation. Nearly 60 per cent of firms pay their fitters exclusively on a timework basis; another 17 per cent pay all their fitters by results[1]; so that in less than a quarter of the firms are there both timeworking and pieceworking fitters. In these firms, the timeworkers tend to be in the minority, although it is fairly common to find about equal numbers of both. On average, firms using both systems of payment are larger than those where only one is found[2]: thus, although there are pieceworking fitters in only about 40 per cent of firms, they easily outnumber the timeworking fitters in the industry.

Our basic distributions of firms by the average earnings and hours worked of their timeworking fitters are given in Table IV. In weekly earnings, the full range of the firm-averages was well over £10, although half of them fell within the relatively narrow compass of £2 : 6*s*. (Table IVa). The mode of the distribution, which is decidedly skewed, was about £9 : 5*s*. Of course, some of the very high and very low averages will have been due to overtime and short-time working; and the distribution by average hours worked is given in the second part of Table IV.

TABLE IV

Distribution of Firms according to the Average Earnings and Hours Worked of their Timeworking Fitters

Average weekly earnings (*s*.)	*Firms*		*Average hours worked*	*Firms*		*Average hourly earnings* (*s*.)	*Firms*	
	no.	%		*no.*	%		*no.*	%
Under 130	31	*1.5*	Under 42	82	*3.9*	Under 3.0	17	*0.8*
130—	74	*3.5*	42—	38	*1.8*	3.0—	39	*1.8*
140—	126	*5.9*	43—	125	*5.9*	3.1—	43	*2.0*
150—	193	*9.1*	44—	239	*11.3*	3.2—	101	*4.8*
160—	236	*11.1*	45—	126	*5.9*	3.3—	121	*5.7*
170—	242	*11.4*	46—	146	*6.9*	3.4—	147	*6.9*
180—	261	*12.3*	47—	151	*7.1*	3.5—	165	*7.8*
190—	228	*10.8*	48—	172	*8.1*	3.6—	195	*9.2*
200—	190	*9.0*	49—	150	*7.1*	3.7—	206	*9.7*
210—	157	*7.4*	50—	163	*7.7*	3.8—	175	*8.3*
220—	124	*5.9*	51—	133	*6.3*	3.9—	155	*7.3*
230—	94	*4.4*	52—	129	*6.1*	4.0—	161	*7.6*
240—	65	*3.1*	53—	97	*4.6*	4.1—	153	*7.2*
250—	32	*1.5*	54—	70	*3.3*	4.2—	75	*3.5*
260—	28	*1.3*	55—	63	*3.0*	4.3—	96	*4.5*
270—	16	*0.8*	56—	51	*2.4*	4.4—	69	*3.3*
280—	3	*0.1*	57—	36	*1.7*	4.5—	38	*1.8*
290—	9	*0.4*	58—	42	*2.0*	4.6—	32	*1.5*
300—	2	*0.1*	59—	27	*1.3*	4.7—	33	*1.6*
310—	1	*0.0*	60—	14	*0.7*	4.8—	27	*1.3*
320 and over	6	*0.3*	61 and over	64	*3.0*	4.9 and over	70	*3.3*
Total	2,118	*100*	Total	2,118	*100*	Total	2,118	*100*

[1] Although many workers may be paid on hybrid systems, if a dichotomy has to be made between timeworkers and pieceworkers the Federation's classification must be as satisfactory as any.

[2] The average employment for firms with fitters on both systems, piecework only, and timework only, is 968, 524, and 237 respectively.

TABLE IVA

Averages and Measures of Dispersion for the Distributions in Table IV

	Average weekly earnings (*s.*)	*Average hours worked*	*Average hourly earnings* (*s.*)
Mean	189.0	49.4	3.88
Median	185.7	48.8	3.81
Interquartile range	46.1	7.1	0.60
Interdecile range	85.9	12.6	1.17
Coefficient of variation	*18.2*	*11.3*	*12.7*

Short time was being worked, on average, by timeworking fitters in about a ninth of the firms, while overtime was worked in over three-quarters of them. Naturally there is some bunching at 44 hours (the standard week); but apart from this the distribution is fairly flat, though with perceptible peaks at 48 and 50 hours which probably reflect Saturday working. It is of course impossible to deduce much from these figures about the extent of overtime or short-time working. It would, for example, be quite wrong to conclude from Table IV that three-quarters of timeworking fitters were working overtime, if only because the firms in which overtime was worked might be those employing larger or smaller numbers of timeworking fitters than average. In any case there is no reason to suppose that all the timeworking fitters in a firm work the same hours, and their average hours worked would exceed the standard week even if only a fraction of them were working overtime (unless others happened to be working an equal or greater amount of short time).

The distribution of firms according to the average hourly earnings of their timeworking fitters is given in the third part of Table IV. These figures range from the minimum time rate (just under 3*s.*) to well over 6*s.* The mean of the distribution is 3*s.* 10½*d.*, and its mode is about 1½*d.* lower. Although the distribution is also skewed, it is less so than that of weekly earnings. Moreover the variability of hourly earnings is smaller than that of weekly earnings (their respective coefficients of variation being 12.7 and 18.2), because of the variation in average hours worked; and, since we are not further concerned with differences in earnings which are due merely to differences in hours, the subsequent discussion and analysis of patterns of earnings will be based on averages of hourly earnings. However, we have not attempted to correct for overtime premia, and have obtained the average hourly earnings for timeworking fitters in each firm simply by dividing their total earnings by their total hours worked. It is feasible enough to attempt to correct for overtime premia when one is dealing with a few industry-wide averages,[1] but it is hardly practicable here, where it would mean detailed adjustments to thousands of figures. Such a correction would have to be based on some single and more or less arbitrary assumption which might be plausible on average but could not reasonably be applied to individual firms—not only because one firm may differ from another in the way it reckons overtime premia, but also because the extent to which double time and other overtime rates are paid varies greatly between firms and is in any case unknown for any individual firm in a particular week.[1]

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[1] *Cf. op. cit.*, pp. 322–324.

It will have been noted that the raw data from which our distributions are compiled (and on which our subsequent analyses are based) are themselves averages. Because these averages relate to widely differing numbers of workers, it might be thought appropriate to introduce some system of weighting. But, while the variable under consideration is level of earnings, it must be emphasised that our units are individual firms and not individual workers, and that it is with inter-firm differences in earnings that we are primarily concerned. There is, therefore, no case for our giving one firm a greater weight than another simply because it employs more workers—especially since size is one of the factors whose possible influence on a firm's level of earnings we wish to examine. The firm is, after all, the basic economic unit from the point of view of production; and it is the individual firm that makes the decisions, not only about the different types of worker it wishes to employ, but also about their general levels of wages. Both sets of decisions—about general wage policy, and about employment policy—will clearly influence a firm's average level of earnings: for example, an expanding aircraft firm may have high average earnings, not only because of its chronic need for labour, but also because aircraft firms generally employ a very high proportion of skilled workers. However, the effects of differences in labour structure should not influence our earnings figures overmuch, since we are not dealing with manual workers generally but with a single occupation only; and, although no occupation can possibly be fully homogeneous over an industry, in taking timeworking fitters we are at least confining ourselves to a relatively well-defined category.

There is, however, the additional consideration that our data relate to a single week. The differences between our firm-averages could therefore be partly due to the fact that the particular week in which the enquiry was held happened to be a ' good ' or ' bad ' week for individual firms; but in so far as, within firms, ' good ' weeks for some workers coincide with ' bad ' weeks for others, week-to-week variations in earnings will tend to be averaged out. In any case we are not proposing to use weekly earnings (which would be greatly influenced by week-to-week variations in overtime and short time), but hourly earnings.

As we have seen, firms vary enormously in size (as measured by total employment); so that it is not surprising to find a very great variation in the numbers of timeworking fitters employed. A summary distribution is given in Table V: nearly a third of the firms employ fewer than 5 timeworking

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[1] Because no correction is being made for overtime premia, these premia will, of course, be one of the many factors contributing to the variability of our firm-averages of hourly earnings.

TABLE V

Variability between Firm-Averages of Timeworking Fitters' Earnings

Number of timeworking fitters	*Number of firms*	*Standard deviation of firm-averages of hourly earnings* (s).
1	198	0.517
2— 4	482	0.505
5— 10	516	0.435
11— 20	408	0.503
21— 50	336	0.468
51—100	112	0.503
101 and over	66	0.523
All firms	2,118	0.492*s*.

fitters, whereas a little over three per cent employ more than 100. In nearly ten per cent, there is only 1—so that the 'firm-average' here is, in fact, the average hourly earnings for a single worker. If the fitters employed by each firm were a random sample from all the timeworking fitters in the country, one would expect more variability in the firm-averages based on a few workers than in those based on many. But one obviously cannot assume that each firm recruits its workers at random from the industry at large, if only because firms tend to specialise and to pick their labour accordingly from the supply locally available. However, because there might nevertheless be some relation between the variability of the firm-averages and the numbers on which they were based, we calculated the standard deviations of the firm-averages within each of the seven size-groups in Table V. It can be seen that there is no systematic connexion between standard deviation and number of fitters, although as a matter of fact the largest standard deviation occurs for the largest firms.

We shall not analyse our data any further according to the numbers employed in the particular occupational category we are considering, since we are proposing to examine the relationship between earnings and size of firm, and total employment is a better indicator of firm-size than employment in any single occupation.

(*ii*) *Earnings by size of firm, section of industry, and location*

In our previous article,[1] we described and analysed the patterns of earnings obtained when firms were grouped according to their location and type of engineering. In view of the very great disparity between firms as regards numbers employed, it is also worth while considering—now that we have the data—to what extent earnings may vary with size of firm. In this context, size of firm is not a particularly significant economic variable, except in so far as size implies previous growth, and hence some measure of success and —possibly—of market control. There are of course many other factors which may happen to be associated with size of firm[2]: for example, labour productivity, efficiency—especially if there are increasing returns to scale—and a high degree of union organisation in the workshop;

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[1] *Op. cit.*, pp. 302 ff.

[2] For some limited evidence on this point, see the article on *Small Manufacturing Businesses* by James A. Bates and Michael Stewart in this issue.

and unidentified factors such as these may influence earnings and thus contribute to any observed relationship between earnings and size of firm. Thus, when we talk of the ' effect ' of size of firm on earnings, we mean the *net* effect of such factors (for we cannot isolate any of them) at various size-levels. However, there are in addition two characteristics of firms—location and type of engineering—which also may not be independent of size. Thus large firms may congregate in particular districts; and, to take an example, aircraft can hardly be manufactured in small firms. These characteristics we do know for each firm, and we can therefore take them into account. But before doing so we propose to show the overall relationship between earnings and size of firm.

In order to see the form of this relationship, we began by plotting the means of the firm-averages of timeworking fitters' hourly earnings in firms of different sizes (taking 31 size-groups) against the means of the size of firm. We found that the general upward slope of the line connecting the points was relatively steep at first but flattened out as the size of firm increased. This suggested that the relationship would be approximately linear if logarithms were taken of firm-size : which would mean not only that the *marginal* ' effect ' of size of firm on earnings is less marked as the size of firm increases but, more specifically, that it varies inversely with size of firm.[1]

TABLE VI

Timeworking Fitters' Hourly Earnings and Size of Firm

Size-group (total numbers employed)	*Number of firms*[1]	*Mean size of firm*	*Firm-averages of hourly earnings* :			
			mean (s.)	*median* (s.)	*inter-quartile range* (s.)	*inter-decile range* (s.)
1— 49 ...	486	27	3.71	3.67	0.59	1.05
50— 99 ...	344	74	3.81	3.75	0.50	1.08
100—199 ...	373	144	3.87	3.79	0.59	1.18
200—499 ...	416	325	3.94	3.88	0.52	1.05
500—999 ...	217	713	3.97	3.95	0.61	1.14
1,000 and over ...	213	2,536	4.15	4.09	0.71	1.44
All sizes	2,049	450	3.88	3.81	0.61	1.17

[1] In addition to the 2,049 firms in the table, there were 69 others employing timeworking fitters for which total employment was not known.

In Table VI, the firms employing timeworking fitters are divided into six size-groups, each containing between 200 and 500 firms; and the mean sizes of firms, together with the means, the medians, and the interquartile and interdecile ranges of the firm-averages of hourly earnings, are given for each size-group. The table is illustrated by Diagram I, where the size of firm is shown on a logarithmic scale in order to bring out the relationship just noted. The regression line largely overlies the line connecting the means, and is therefore not shown on the diagram.[2]

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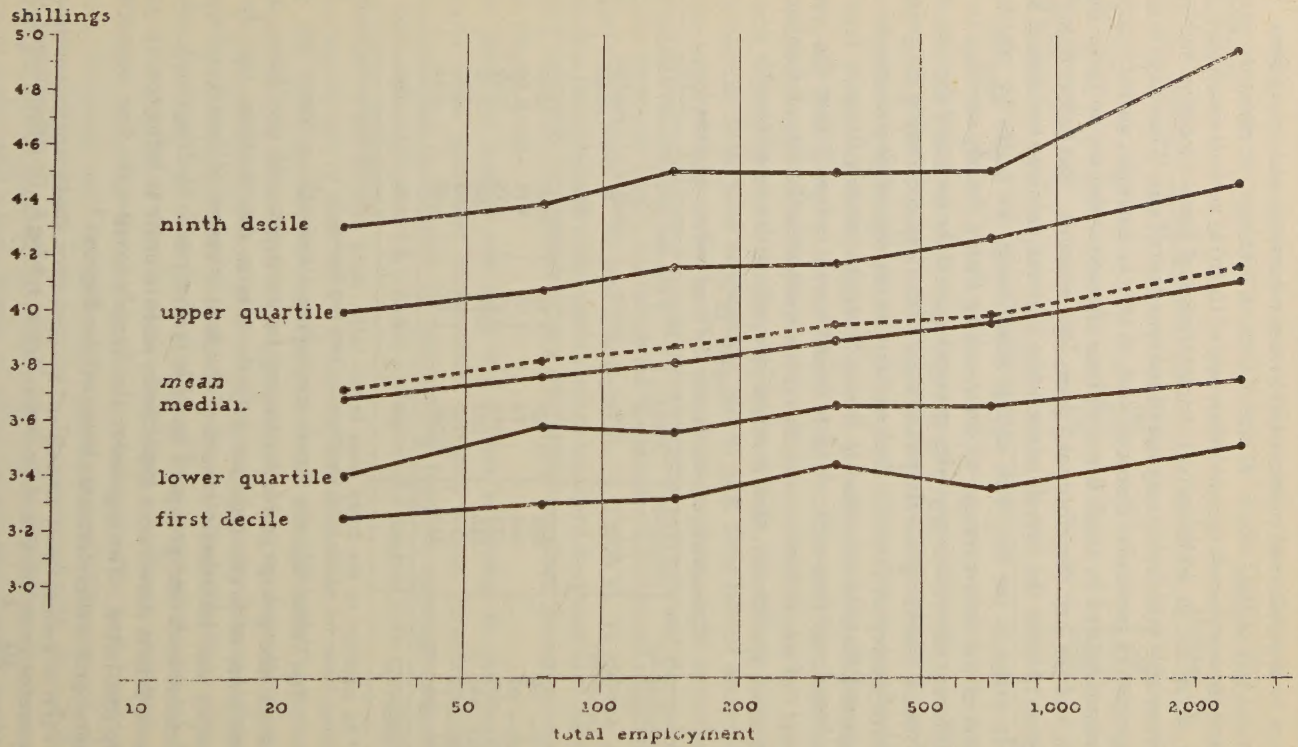
[1] If H = average hourly earnings and S = size of firm, the form of the association can be represented by an equation of the type : $H = a + b \log S$. On differentiating, therefore, we have : $\frac{dH}{dS} = \frac{b}{S}$.

[2] The regression equation is: $H = 3.424 + 0.2065 \log_{10} S$.

I. Timeworking Fitters' Average Hourly Earnings & Size of Firm



NOTE.—Total employment is measured on a logarithmic scale: the vertical lines indicate the boundaries of the six size-groups shown in Table VI, the points plotted being at the means of these groups. The statistics of earnings relate to the distributions of the *firm-averages* within each of the six size-groups.

The relative positions of the means and medians, and of the quartiles and deciles, show that the distribution within each size-group is skewed, the averages of earnings being rather more tightly bunched below the median. Moreover, within each size-group the dispersion is very wide when compared with the differences between the means of earnings for firms in the different size-groups, or with expected differences deduced from the regression equation. Thus, if one firm is ten times the size of another, average hourly earnings in the bigger firm can be expected to be only 0.2 of a shilling higher than in the smaller; whereas the interquartile range for any one size-group is about three times as great as this, and the interdecile range over five times as great.[1] Nor does the dispersion vary systematically with the size of firm, although the ranges widen noticeably in the top size-group. This may be compared with Table V (where the greatest standard deviation was found for those firms employing the most timeworking fitters).

It is clear that the overall association between earnings and size of firm is in fact very weak. But one might get a grossly exaggerated impression of its strength if the only data available were averages of earnings for firms in different size-groups. Thus, if we correlate our means of earnings with the log mean sizes of firm for our six groups, we obtain a coefficient of no less than + 0.95. The reason for this high correlation[2] for the grouped data is, of course, that the very great dispersion about the means has been averaged out. Unfortunately, wage statistics are often available only in the form of global totals and their corresponding averages ; and in working with such data it is difficult to avoid giving misleading impressions of the strength of an association.[3] But when we allow for the dispersion about our means of the firm-averages of hourly earnings by calculating the correlation for the original data ungrouped, the coefficient is no higher than + 0.27; and, although this is still highly significant in a statistical sense, it signifies a very feeble connexion. If we take the square of the correlation coefficient as a better measure of the strength of an association, we may say that only about 7 per cent of the variation in the firm-averages of hourly earnings can be ascribed to linear regression on log size of firm.

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[1] Such a picture is not peculiar to engineering : the Boot and Shoe Working Party, for example, stated that ' there is a tendency for earnings . . . to vary with the size of firm. . . . Moreover, there is a very great dispersion in earnings within each size group.' (*Report*, 1946, p. 66.).

[2] So high a figure is probably not exceptional. Tables of average hourly earnings in firms falling within various size-ranges were compiled, though not published, by the Ministry of Labour in 1950. From that for ' other non-electrical engineering ', based on some 2,800 firms, a correlation coefficient of + 0.97 is obtained between men's average hourly earnings and log size of firm in seven size-ranges. Tables for other industries appear to give similar results.

[3] Professor Sumner H. Slichter, for instance, in *Notes on the Structure of Wages* (*Review of Economics and Statistics*, February 1950) correlated the average hourly earnings of unskilled male workers with the average values of product per wage-earner-hour in various industry-groups. He found the high rank correlation coefficient ' surprising '—and sought to explain this in economic terms. Statistically, however, the high coefficient need have occasioned little surprise ; for even the weakest of associations in the original data would have resulted in a high correlation coefficient if the data had been condensed into few enough groups. (See Yule and Kendall, *Introduction to the Theory of Statistics*, 14th edition, pp. 313–314.)

One may, similarly, get a greatly exaggerated impression of the strength of the regional and sectional patterns of earnings if the only data available are averages of earnings for entire districts and types of engineering. Thus we found pronounced differences between the averages for different regions and sections of industry, and the resulting regional and sectional patterns seem, by and large, to be fairly persistent over time. These patterns we have described at some length in earlier articles. But as soon as we are able to look at the variability in average earnings between firms *within* single districts and sections, the patterns are immediately blurred. For example, in our previous article we stressed the fact that average earnings for Coventry are, and have long been, exceptionally high compared with those for all other district associations. But within the Coventry association itself the firm-to-firm variability in timeworking fitters' average hourly earnings is actually greater than that for the industry as a whole[1]; indeed, the distribution of firm-averages for Coventry overlaps, to a greater or lesser extent, that for almost every other district in the country—which means that there are firms in virtually every district paying as much or more than some Coventry firms. Between the other districts, of course, there is even more overlapping in the distributions: indeed, despite differences between district averages of earnings, the distributions of firm-averages for different districts—and even more for whole regions—generally coincide over the greater part of their respective ranges. Thus the mere fact of living in a region where average earnings are relatively low by no means precludes the possibility of working in a firm where earnings compare favourably with those in most firms in even the highest-paying regions.

The same is true of the various sections of the industry. This is illustrated by Diagram II, where the distributions of firm-averages for the two highest-paying sections in the Federation's classification (motors & cycles, and aircraft), and for the lowest-paying section (agricultural machinery) are shown. As might be expected, the latter is virtually J-shaped, for a low average suggests some bunching near the minimum rate. Nevertheless, although we have selected the extreme cases, there is still some overlap between the distributions for the lowest- and highest-paying sections. Thus, if we were to choose a firm at random from each of the three sections, the probability of timeworking fitters' average hourly earnings in the firm making agricultural machinery exceeding those in the motor or cycle firm would be about 12 per cent[2]: in other words, the odds against the former actually paying *more* than the latter are less than 8 to 1. Similarly, the odds against an agricultural machinery firm paying its timeworking fitters more than an aircraft firm are about 20 to 1. While these probabilities are small because they are based on the extremes of sectional earnings, there is usually—as

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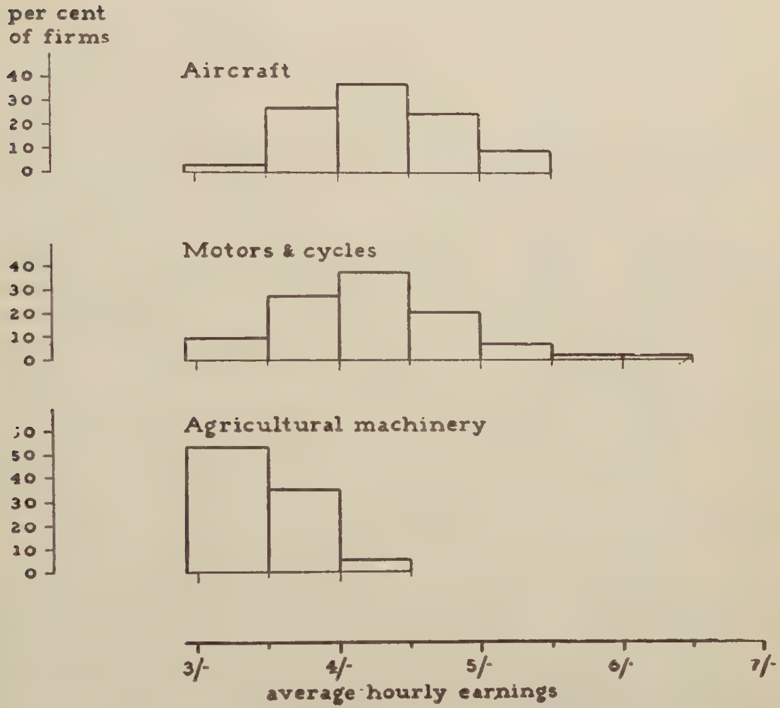
[1] Interquartile ranges of firm-averages: Coventry 1.02*s.*, whole industry 0.60*s.*; standard deviations: Coventry 0.74*s.*, whole industry 0.49*s.*

[2] The concept of a wage differential measured in probability terms has been discussed at some length in an earlier article (*On the Difficulties of Measuring Wage Differentials*, BULLETIN, November–December 1954).

II. Distribution of Timeworking Fitters' Average Earnings in Three Sections of the Industry



with districts—a very considerable overlap between the distributions of firm-averages. If we compare the two high-paying sections, we find that the mean of the distribution for aircraft (4.34*s.*) is very slightly higher than that for motors (4.22*s.*),[1] and that in probability terms there are about four chances in seven of an aircraft firm paying its fitters more than a firm making motors or cycles.

But the variability exhibited by all the distributions we have been considering—by size of firm, by district, and by type of engineering—is due to our having classified our firms by a single factor only when there are obviously many factors influencing earnings. In so far as some of these factors are correlated with that under consideration, any overall relationship we

[1] It may have been noted from our previous article that the average hourly earnings of timeworking fitters in motors & cycles were higher than in aircraft, whereas here we find that the (unweighted) means of the firm-averages in these sections are in the reverse order. This is explained by the fact that there are one or two motor firms paying very high earnings which employ exceptionally large numbers of timeworking fitters. The firms in question account for less than 3 per cent of the total of firms in the section, but employ nearly a third of all the timeworking fitters.

examine will, as we pointed out above, be a compound one. In other words, the earnings pattern obtained by grouping the data according to any single factor is liable to be distorted by the net effect of other factors : it would be surprising if the other factors happened to cancel each other out in such a way that there was no distortion at all.

We now propose to try to remove from the overall relationship between earnings and firm-size that part of the possible distortion which is due to the influence of the two main factors about which we have information : location and type of engineering. Simultaneously we shall try to remove from the overall pattern of earnings by type of engineering the effect of any distortion introduced by size of firm and location, and also to correct the district differences in earnings for size of firm and type of engineering.[1]

The model underlying our analysis is, in principle, very simple. We are supposing that average hourly earnings in each firm comprise five elements : (1) a constant common to all firms in the industry, (2) one common to all firms in the same size-group, (3) one common to all firms in the same section of industry, (4) one common to all firms in the same district, and finally (5) a residual term. The method of estimating these constants is that of least squares : *i.e.*, the sum of the squares of the residual terms is minimised; in other words, the form of the analysis is that of multiple regression. In our model, the ‘ effects ’ of firm-size, location, and type of engineering are treated as independent and additive; and, as we shall see, this seems to be consistent with the data.

As such an analysis is necessarily very laborious, and as it is better to work with relatively distinct and well-defined sections of industry and districts, we propose to restrict the field somewhat. But any selection we make must be guided by a number of competing considerations. Thus we need types of engineering which are not only fairly homogeneous and industrially distinct, but also types which are found in most parts of the country; and we are therefore choosing constructional engineering, electrical engineering, foundries, machine tools, and motor cars & cycles. Similarly, we have chosen five districts which are not only fairly compact in themselves but are also in different parts of the country—and which are sufficiently diversified to contain an adequate number of different types of engineering. There are 252 firms with timeworking fitters in these five sections of the industry in the five districts; and it was decided to group them into five size-ranges. However, we are now excluding those firms in which there was only a single timeworking fitter—because, for the 252 firms selected, the variance of the averages of hourly earnings for the single-fitter firms was found to be about twice as high as that for the rest. This reduces the firms from 252 to 219.

In order to obtain estimates of the constants described above, we have to eliminate from the differences between the means of the firm-averages for particular size-groups, sections, and districts that part which may be

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[1] In our previous article we tried to disentangle from each other the effects of location and type of engineering ; but we had no data concerning size of firm.

TABLE VII

Relationships between Earnings and Size of Firm, Section and District

Factor	*Number of firms* (1)	*Mean of firm-averages* (*s.*) (2)	*Difference between* (2) *and overall mean*[1] (3)	*—of which:*	
				concentration component (4)	*'true' effect* (5)
Size of firm[2]					
1— 49	*22*	3.71	—0.20	+0.02	—0.22
50— 99	*29*	3.74	—0.17	+0.00	—0.17
100—199	*40*	3.85	—0.06	—0.04	—0.02
200—499	*47*	3.93	+0.02	—0.04	+0.06
500 and over	*81*	4.04	+0.13	+0.04	+0.09
Section of industry					
Constructional	*32*	3.73	—0.18	+0.00	—0.18
Electrical	*83*	3.86	—0.05	+0.03	—0.08
Foundries	*40*	3.80	—0.11	—0.10	—0.01
Machine tools...	*25*	3.89	—0.02	—0.12	+0.10
Motors and cycles	*39*	4.27	+0.36	+0.11	+0.25
District					
A	*25*	3.67	—0.24	—0.04	—0.20
B	*35*	3.73	—0.18	—0.03	—0.15
C	*25*	3.72	—0.19	—0.08	—0.11
D	*71*	4.03	+0.12	+0.09	+0.03
E	*63*	4.04	+0.13	—0.04	+0.17
All above firms	*219*	3.91	zero	zero	zero

[1] *I.e.* 3.91*s.*, the mean of the 219 firm-averages.

[2] *I.e.* total employment.

due to the concentration[1] within these groupings of firms of particular types. For example, the high mean for large firms is partly due to the fact that many of these are motor firms which pay high wages anyway. After eliminating in each case the ' concentration component ' due to the other two sets of factors, we arrive at estimates of the effect on earnings of the factor under consideration. These estimates appear in column (5) of Table VII (although it must be remembered that what we call the ' true' effect of a particular factor may still be the composite effect of this factor and a variety of others which cannot be included in our analysis). We may now examine the three sections of the table.

As regards size of firm, it is clear that the relation between earnings and firm-size is not systematically affected by regional and sectional concentration—*i.e.* by the industrial and geographical structure of the different size-groups. However, the difference in earnings between the two size-groups containing the largest and second-largest firms is substantially reduced by the removal of the concentration component. This, as was suggested above, is mainly due to the fact that most motor firms are large.

In the case of section of industry, the effect of size and district concentration is relatively more important: it lowers the means for foundries and machine tools, and raises that for motors. Part of the reason for this is the there are proportionately more small firms in the former two sections, and proportionately more large firms in the latter.

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[1] This concept, together with the method of calculation adopted, was fully discussed in *The Structure of Engineering Earnings*, to which the reader is again referred.

As for the selected districts, the most striking feature is the effect of size-and-section concentration on district D—which again is due to large motor firms. When this effect is eliminated, the difference between the mean for district D and that for any other district is reduced by at least 0.12*s*. (*i.e.* the difference between + 0.09*s*. and −0.03*s*.).

Thus the effect of concentration (*i.e.*, the very uneven distribution of firms in respect of their size, location, and type of engineering) is greatest on the means for section of industry, and smallest on the means for size-groups. How far may we claim that such results are characteristic of the industry as a whole, and not merely of the particular selection of firms we have made? As regards section of industry and district, our present results compare quite closely with those based on the (all-sections, all-districts) analysis given in our previous article—although size of firm could not then be included as a factor. Minor discrepancies between our previous and present results may be partly accounted for by our having previously been unable to take firm-size into account: for example, the relatively lower 'true' effect we now find for electrical engineering may to some extent be due to the fact that many electrical firms are large. As regards size of firm, the form of the relationship between our 'true' effects and firm-size is very similar to what we found above when we took all firms into account; for the concentration components for each size-group are comparatively insignificant, and also uncorrelated with firm-size.

The conclusion that the factors we have been considering exert influences on earnings is clear enough; but our assumption that these influences were independent and additive does require some justification, and before going on to examine piecework and skill differentials we may pause to consider the statistical significance of our findings. Table VIIa shows the results of an analysis of variance carried out on our data.

In this table, the variation in the firm-averages is first broken down into two parts: (*a*) that arising *between* different 'combinations' (of district, section, and firm-size), and (*b*) that arising between firms *within* each 'combination'.[1] Secondly, the variation between 'combinations' (*a*) is itself broken down into two further parts: (*c*) that arising from the fitted constants, or 'true' effect of our three factors, and (*d*) that arising from various possible interactions between these factors.

The differences between the means of the firm-averages for firms in different 'combinations' (*a*) are statistically significant; indeed, if they were not, there would have been little point in carrying the analysis further. When (*a*) is broken down into (*c*) and (*d*), it appears that (*c*) is highly significant,

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[1] It may be observed that the average variance for firms within the same district, section, and size-group is only 14 per cent less than the variance for all our selected firms together.

TABLE VIIA

Analysis of Variance by Size of Firm, Section, and District

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean square*	*Variance ratio*
(*c*) Effects of the 3 factors[1] ...	12	12.20	1.016	5.21**
(*d*) Interactions	68	10.35	0.152	0.78
(*a*) Between 'combinations'[2] ...	80	22.55	0.282	1.45*
(*b*) Residual	138	26.90	0.195	
Total	218	49.45		

Level of significance: ** $0.01 > P$ * $0.05 > P > 0.01$

[1] *I.e.*, component of variation attributable to the combined effect of the fitted constants for size of firm, section, and district, shown in column (5) of Table VII.

[2] *I.e.*, each combination of size-group, section, and district for the 219 firms in Table VII. Although the maximum possible number of combinations for a 5 × 5 × 5 table is 125, for these data there are 44 empty cells.

whereas (*d*) is not significant—indeed, the mean square for interactions (*d*) is actually smaller than the residual mean square (*b*). In other words, the effects of firm-size, district, and section of industry are marked, severally and in combination; and there is no indication, in general, of significant interactions between them. This confirms the basic assumption underlying our model—that the effects of the three factors are independent: in other words, the effect of firm-size on earnings is the same irrespective of the section of industry and district in which the firm happens to be, and the effect of section of industry (or district) on earnings is the same irrespective of the size group and district (or section) in which the firm is found.[1]

(*iii*) *Relationship between timeworkers' and pieceworkers' earnings*

In principle, the relationship between timeworkers' and pieceworkers' wages (strictly speaking, between time rates and pieceworkers' expected minimum earnings) is controlled by national agreement. In the previous article we discussed the form of this relationship in some detail, and examined the relationship between average levels of earnings for all timeworking and all pieceworking fitters in the industry as a whole. But if the purpose of the national agreement is to influence the relative levels of *earnings* of timeworkers and pieceworkers, this influence should surely operate more obviously between workers in the same firm than between workers from different firms. As we have already seen, less than a quarter of the firms contain both timeworking and pieceworking fitters; and for these firms one might expect the time/piece relationship to be different from what it is for all timeworking and pieceworking fitters in the industry. Moreover, since pieceworkers generally earn more than timeworkers, one might also expect that timeworking fitters' earnings, in firms where there are also fitters on piecework, would tend to be pulled up—for instance, by means of lieu rates—by the higher piecework earnings.

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[1] Moreover, the absence of significant interactions is consistent with the other assumption underlying our model, namely that the three effects are additive. However, any relationship may be approximated to by an additive one, provided that—as here—the extent of variation is relatively small.

TABLE VIII

Distributions of Firms according to Fitters' Average Hourly Earnings and System of Payment

Average hourly earnings (*s.*)	*Firm-averages for timeworking fitters*			*Firm-averages for pieceworking fitters*		
	firms with fitters exclusively on timework (1)	*firms with fitters on each system of payment* (2)	(*1*) *and* (*2*) *combined* (3)	*firms with fitters exclusively on piecework* (4)	*firms with fitters on each system of payment* (5)	(*4*) *and* (*5*) *combined* (6)
Under 3.0 ...	13	4	17	1	1	2
3.0—	26	13	39	—	—	—
3.1—	27	16	43	1	4	5
3.2—	73	28	101	1	7	8
3.3—	94	27	121	6	7	13
3.4—	103	44	147	14	22	36
3.5—	113	52	165	21	14	35
3.6—	138	57	195	16	23	39
3.7—	156	50	206	27	37	64
3.8—	120	55	175	43	44	87
3.9—	113	42	155	41	52	93
4.0—	120	41	161	32	60	92
4.1—	114	39	153	33	46	79
4.2—	52	23	75	35	32	67
4.3—	69	27	96	33	36	69
4.4—	47	22	69	20	43	63
4.5—	26	12	38	21	30	51
4.6—	24	8	32	17	19	36
4.7—	20	13	33	14	21	35
4.8—	24	3	27	19	28	47
4.9—	10	7	17	7	20	27
5.0—	10	8	18	7	6	13
5.1—	3	3	6	5	7	12
5.2—	1	2	3	2	11	13
5.3—	2	3	5	2	8	10
5.4—	2	2	4	6	6	12
5.5—	1	1	2	3	3	6
5.6—	1	1	2	1	3	4
5.7—	—	3	3	—	1	1
5.8—	2	—	2	1	3	4
5.9—	2	—	2	1	6	7
6.0 and over ...	3	3	6	7	9	16
Total ...	1,509	609	2,118	437	609	1,046
Mean (*s.*) ...	*3.87*	*3.90*	*3.88*	*4.23*	*4.29*	*4.27*
Median (*s.*) ...	*3.81*	*3.82*	*3.81*	*4.15*	*4.17*	*4.16*
Interquartile range (*s.*) ...	*0.59*	*0.63*	*0.60*	*0.67*	*0.71*	*0.69*

For these reasons, we compiled separate distributions of the firm-averages for timeworkers and pieceworkers according as firms (*a*) paid their fitters exclusively by time or by results, or (*b*) used both systems of payment. These distributions are given in Table VIII. While the level of pieceworkers' earnings is generally rather higher than that of timeworkers' (the difference between the means of their firm-averages is 0.4*s.*), the ' combined ' distribution for pieceworkers (column 6) is similar to that for timeworkers (column 3)[1]—although it has slightly greater dispersion and is rather more skewed. When we consider the separate distributions both for timeworkers and for pieceworkers, we find that in each case—but particularly for pieceworkers—the average level of earnings is slightly higher for those firms where both systems of payment are used than for those where only one obtains. This could easily be explained by the fact that, on average, the firms using both systems of payment are large.[2] However, because the differences between the means in columns (1) and (2) of Table VIII, and also between those in columns (4) and (5), are small, the time/piece relationship is on average practically the same for firms using only one system of payment as for firms using both: in percentage terms, the piecework differential for the former is 109.3 and for the latter 110.0 per cent.[3]

As we have just seen, the difference between the means of the firm-averages for pieceworkers' and for timeworkers' hourly earnings is 0.4*s.* But this is small in relation to the range and dispersion of either of the 'combined' distributions on which the means are based, and these distributions overlap extensively. If we were to choose at random a firm in which there were pieceworkers, and also one in which there were timeworkers, the probability of the firm-average for the former being greater than that for the latter would be 70 per cent; thus there are three chances in ten of the timework average being actually greater than the piecework average. There is a 50–50 chance of the piecework average being at least 0.4*s.* higher than the timework average. (As it happens, this figure coincides with the difference between the means of the original distributions of the firm-averages.)

Not only do we find very great variation in the differences between the firm-averages of earnings for pieceworkers and timeworkers from different firms, but the difference between the average earnings of pieceworkers and timeworkers within the same firm also varies widely from one firm to another. This is clear from Table IX, where the 609 firms in which there are both timeworking and pieceworking fitters are grouped according to the average hourly earnings of each category. If there were anything like a uniform piecework differential,[4] it would be reflected in this table by a marked concentration about a line a little above the diagonal. That there is some such concentration is shown by a coefficient of +0.47 for the correlation between the average hourly earnings of timeworkers and pieceworkers in the same firm; but this does not indicate a very strong association, and the variability between firms in the piecework differential is clear from the considerable scatter about the diagonal. Indeed, in over a fifth of the firms the differential is inverted—the timeworkers actually earning more, on average, than the pieceworkers.

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[1] This has already been considered in connexion with Table IV. [2] *Cf.* p. 101.

[3] *I.e.*, the mean for column (4) divided by that for column (1); and that for column (5) divided by that for column (2).

[4] *I.e.*, if the ratio or difference between pieceworkers' and timeworkers' earnings were more or less constant.

TABLE IX

Distribution of Firms according to the Average Hourly Earnings of their Timeworking and Pieceworking Fitters[1]

Timeworking fitters' average hourly earnings (*s.*)	*Pieceworking fitters' average hourly earnings* (*s.*)																	*Total*
	Under 3.0	3.0–	3.2–	3.4–	3.6–	3.8–	4.0–	4.2–	4.4–	4.6–	4.8–	5.0–	5.2–	5.4–	5.6–	5.8–	6.0 *and over*	
Under 3.0	—	—	1	1	1	1	—	—	—	—	—	—	—	—	—	—	—	4
3.0—	—	1	3	6	5	5	3	2	—	1	2	—	—	1	—	—	—	29
3.2—	—	2	3	8	5	16	6	5	2	1	1	2	3	—	—	—	1	55
3.4—	1	—	2	9	14	18	23	11	7	3	3	1	1	—	—	1	2	96
3.6—	—	1	—	4	9	20	26	15	17	6	5	1	2	1	—	—	—	107
3.8—	—	—	2	3	13	11	25	12	12	8	8	—	1	1	—	—	1	97
4.0—	—	—	1	1	6	8	14	6	19	8	8	2	5	—	—	1	1	80
4.2—	—	—	1	2	4	10	4	10	4	6	5	3	—	—	1	—	—	50
4.4—	—	—	1	1	2	4	5	3	6	—	5	1	1	2	1	2	—	34
4.6—	—	—	—	—	1	—	—	3	5	4	3	2	1	1	—	—	1	21
4.8—	—	—	—	—	—	—	—	—	—	2	5	—	1	1	1	—	—	10
5.0—	—	—	—	1	—	1	—	1	1	—	3	1	1	1	—	1	—	11
5.2—	—	—	—	—	—	1	—	—	—	1	—	—	2	—	—	1	—	5
5.4—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1	—	1	3
5.6—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	3	—	4
5.8—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6.0 and over	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	2	3
Total	1	4	14	36	60	96	106	68	73	40	48	13	19	9	4	9	9	609

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[1] Firms whose fitters are exclusively on timework or exclusively on piecework are not included in this table (*cf.* Table VIII).

Such variability in the piecework differential is not very surprising. It is due to many factors: firms may indulge in loose piecework pricing; they may pay special types of fitters either by time or by the piece; the distinction between timework and payment by results is itself variable and often nebulous. In any case the control by national agreement is minimal.

(*iv*) *Relationship between the earnings of skilled and unskilled*

Fitters and labourers are still the only occupations for which specific wage rates are settled by national agreement, a few other occupations having nationally agreed differentials based on one or other of these two rates. The rates are essentially minima, and in most firms average earnings are considerably above them. Over the past few years, the Amalgamated Engineering Union has become increasingly concerned about the narrowing in percentage terms of the skill differential based on the minimum rates of fitter and labourers; and recent national increases have been graded according to skill. We have previously examined the differential based on average hourly earnings (always rather wider than that based on rates), and its course over time; and we now propose to examine its variability between individual firms.

In Table X are shown distributions of firms according to the average hourly earnings of timeworking labourers, together with those for timeworking fitters. As in Table VIII, we have separated out those firms in which there are both (in columns 1 and 3). If we first look at the two overall distributions (in columns 2 and 4), we see that the labourers' distribution has the same general shape as the fitters, in that each is unimodal and positively skewed. However, there is of course a marked difference in their means: this is 0.84 *s.*, *i.e.* a little more than twice the difference between the minimum rates (0.41*s.*). There is also a marked difference in respect of their dispersion—that for labourers, whether measured by the quartile deviation or the standard deviation, being only about 60 per cent of that for fitters; but both distributions are about equally skewed. The overlap between the two distributions is very small (far smaller than that between the analogous distributions for pieceworking and timeworking fitters given in Table VIII): thus, while for fitters 85 per cent of the firm-averages are *above* 3.4*s.*, for labourers 88 per cent fall *below* this level. Because there is so little overlap, if we were to choose at random a firm in which there were fitters and also one in which there were labourers, the probability of the fitters' average being greater than the labourers' would be no less than 94 per cent; in other words, the odds are nearly 16 to 1 against the labourers' average being higher than the fitters'. There is an even chance that the fitters' average will be *at least* 0.81*s.* greater than the labourers'.

We may now examine the variability from firm to firm in the fitter/labourer differential, by taking only those firms in which there are both timeworking fitters and labourers. It can be seen at once from Table X that the distributions of the firm-averages for these firms of fitters' and

TABLE X

Distributions of Firms according to the Average Hourly Earnings of Fitters and Labourers on Timework

Average hourly hourly (*s.*)	*Fitters—* *in firms where there are also labourers* (1)	*Fitters—* *in all firms* (2)	*Labourers—* *in firms where there are also fitters* (3)	*Labourers—* *in all firms* (4)
Under 2.6			49	89
2.6—			111	171
2.7—			227	315
2.8—			280	376
2.9—	12[1]	17[1]	310	402
3.0—	36	39	264	367
3.1—	42	43	222	290
3.2—	89	101	139	192
3.3—	111	121	123	161
3.4—	135	147	76	104
3.5—	147	165	56	74
3.6—	178	195	29	41
3.7—	194	206	21	32
3.8—	167	175	11	16
3.9—	138	155	11	13
4.0—	145	161	8	9
4.1—	142	153	3	7
4.2—	72	75	1	2
4.3—	89	96	—	1
4.4—	65	69	—	1
4.5—	37	38	1	2
4.6—	30	32	2	2
4.7—	32	33	2	2
4.8—	22	27	—	—
4.9—	14	17	—	—
5.0—	16	18	—	1
5.1—	6	6	—	—
5.2—	3	3	—	—
5.3—	5	5	—	—
5.4—	4	4	1	1
5.5—	2	2	—	—
5.6—	2	2	—	—
5.7—	3	3	—	—
5.8—	2	2	—	—
5.9—	1	2	—	—
6.0 and over ...	6	6	—	—
Total	1,947	2,118	1,947	2,671
Mean (*s.*)	*3.88*	*3.88*	*3.05*	*3.04*
Median (*s.*)	*3.82*	*3.81*	*3.00*	*3.00*
Interquartile range (*s.*)	*0.61*	*0.60*	*0.36*	*0.37*

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[1] Under 3.0*s*.

labourers' earnings (columns 1 and 3) are virtually the same as those for all firms. In Table XI we give a two-way breakdown for the 1,947 firms with both fitters and labourers. There is clearly a very great diversity from firm to firm in the 'skill differential', as can be seen from the dispersion within any single row or column of the table. In fact, there is as little uniformity as there was for 'piecework differentials': the correlation coefficient (+0.47) coincides with that based on Table IX.

TABLE XI

Distribution of Firms according to the Average Hourly Earnings of their Timeworking Fitters and Labourers[1]

Timeworking fitters' average hourly earnings (s.)	*Timeworking labourers' average hourly earnings (s.)* Under 2.6	2.6—	2.8—	3.0—	3.2—	3.4—	3.6—	3.8—	4.0—	4.2—	4.4—	4.6 and over	*Total*
Under 3.0	1	5	4	1	1	—	—	—	—	—	—	—	12
3.0—	9	30	26	8	—	1	2	—	—	—	1	1	78
3.2—	5	81	78	27	9	—	—	—	—	—	—	—	200
3.4—	9	71	115	66	12	5	1	2	1	—	—	—	282
3.6—	9	65	145	96	42	13	1	—	1	—	—	—	372
3.8—	7	37	102	96	40	16	5	—	2	—	—	—	305
4.0—	7	19	65	88	65	35	4	3	1	—	—	—	287
4.2—	1	17	25	37	43	24	9	4	1	—	—	—	161
4.4—	1	7	12	32	18	17	10	2	3	—	—	—	102
4.6—	—	2	9	21	11	9	7	3	—	—	—	—	62
4.8—	—	2	4	6	9	4	5	3	2	—	—	1	36
5.0—	—	—	4	3	6	6	1	1	—	—	—	1	22
5.2—	—	1	—	2	1	—	1	2	—	1	—	—	8
5.4—	—	1	—	—	2	1	—	1	—	—	—	1	6
5.6—	—	—	—	1	2	—	2	—	—	—	—	—	5
5.8—	—	—	—	—	—	1	—	1	—	—	—	1	3
6.0 and over	—	—	1	2	1	—	2	—	—	—	—	—	6
Total	49	338	590	486	262	132	50	22	11	1	1	5	1,947

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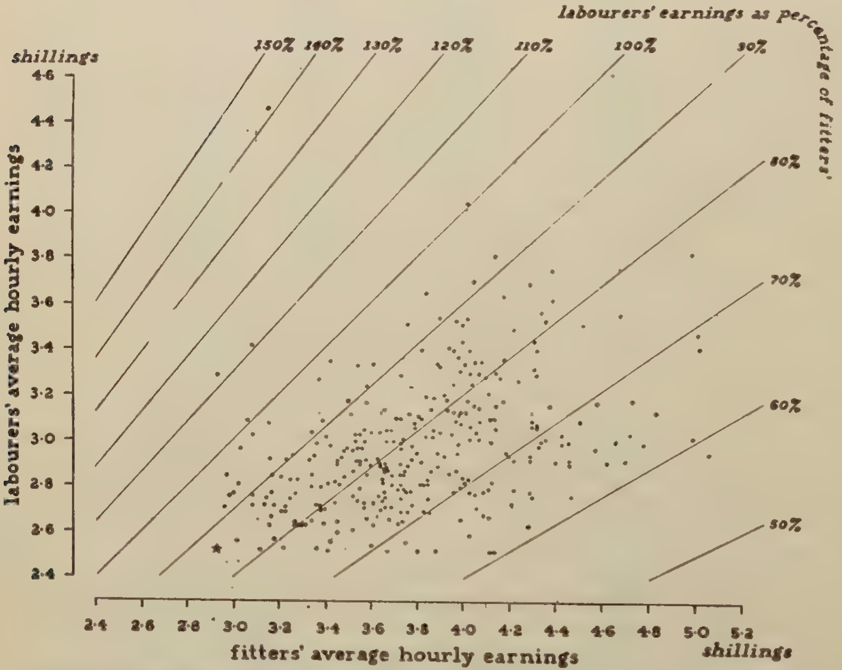
[1] Those firms without timeworking fitters, and those without timeworking labourers, are not included in this table (*cf.* Table X).

A graphical illustration of this diversity is given in Diagram III, where firms are plotted according to the average earnings of their timeworking fitters and labourers. Since it would have been impracticable to plot all the firms in the country, we have taken a single region—which, however, is to some extent a structural microcosm of the whole industry. The radiating lines in this diagram enable one to judge roughly what is the percentage ratio of earnings in any selected firm; and they make it possible to see how these ratios are distributed. As a matter of fact the variability between firms in this region of the fitter/labourer differential seems to be rather greater than it is for the industry as a whole: the correlation coefficient for these firms is +0.38.

III. Distribution of Firms according to the Average Earnings of their Timeworking Fitters & Labourers

(in a single region)



NOTE.—The star indicates the position of fitters' and labourers' minimum time rates.

The variability in the fitter/labourer differential may well, as we have previously suggested,[1] be attributed to the influence on earnings of other factors besides skill. In engineering it is common to find many supplementary payments made over and above the nationally-negotiated time rates. Although these payments—overtime and shift premia, lieu rates, merit rates, incentive payments, etc.—are in principle unrelated to skill, some of them may tend to be associated with it; and if so they will lead to a widening, on average, of the ' skill differential '. But since any such association will be far from perfect, and since other payments may not be associated with skill at all, the relation between the earnings of skilled and unskilled workers could be expected to be highly variable. However, this variability may be also due to other causes : our two categories cannot each be completely homogeneous in respect of skill itself; and in any case different firms may reward skill (or any other attribute) differently.

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[1] *Cf. On the Difficulties of Measuring Wage Differentials.*

All these possibilities contribute in varying degrees to the explanation of the variability we have observed in wage differentials. At this level of enquiry there is no means of assessing the relative importance of each factor, although a detailed study of wage-fixing within a few firms would no doubt enable one to do so.

II. Some Implications of the Variability of Earnings

(*i*) *The significance of inter-firm variability*

In the first part of this article we have indicated the extent of variability in in average earnings between firms, and have shown how far this variability may be explained by the few factors about which we have information. The possibilities of discovering the multifarious determinants of wage-levels by analysing material of the kind we have been using are of course severely limited, without a mass of additional data for each firm relating, for example, to its profits, its productivity, and its progress in recent years. But whatever the factors responsible for variations in average earnings, the variability itself deserves some comment—particularly since a single wage structure covers the whole of engineering.

Is such variability unusual ? While inter-industrial comparisons are difficult (for we have no comparable figures for individual firms in other industries), we doubt whether a similar diversity in the average earnings of skilled timeworkers would be found in any other sector of manufacturing industry covered by a single system of collective agreements. The gap between wage rates and earnings—which can be taken as a rough indicator of variability—is almost certainly greater in engineering than elsewhere : minimum rates in engineering are not particularly high, whereas average earnings are among the highest. Moreover, the rates/earnings gap has been widening over the last twenty-five years (except only at the end of the war) : for skilled workers, it has been growing steadily in percentage terms[1] despite the rapid advance in rates since the end of the wage-freeze. It might be expected that the variability in earnings between engineering firms would be large, if only because no other sector of manufacturing is itself so diverse; for engineering straddles no fewer than 5 ' orders ' or broad industry-groups of the Standard Industrial Classification, and includes 26 separate industries. But the mere diversity of the engineering ' industry ' is not, in itself, enough to explain the diversity of average earnings between firms. For although the differences in earnings levels between sections must contribute to the overall diversity of earnings in the industry, we have seen that, within most sections, the differences in average earnings between firms are very considerable—indeed, within certain sections (particularly the high-wage ones), and for that matter within certain districts also, the variability of earnings is as great or even greater than that for the industry as a whole.

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[1] *Cf. The Structure of Engineering Earnings*, pp. 293–294.

This overall variability can be put into some sort of perspective if it is considered in relation to the amounts of the increases awarded by national agreements. Thus the interquartile range (0.60*s*.) of the firm-averages of timeworking fitters' hourly earnings in 1952 was four times as great as the average national increase per year (0.15*s*.)[1] for the six post-war years 1946–1951, and the interdecile range (1.17*s*.) was almost eight times as great. Even if we compare the variability in earnings with the biggest all-round increase ever awarded in the industry (3*d*. an hour, in November 1951),[2], the interquartile range is well over twice as great as this and the interdecile range nearly five times as great. It must, moreover, be stressed once again that the variability in question relates to averages of hourly earnings for timeworkers within a single occupation; and, while no occupation can be completely homogeneous, fitters are at least readily distinguishable from other occupations.

But the differences in timeworking fitters' average earnings can well be very much larger even than the wage differentials between skilled and unskilled workers. Thus the fitter's minimum time rate is 0.41*s*. an hour above the labourers—which, as we have just seen, is considerably less than the interquartile range of the firm-averages of timeworking fitters' hourly earnings: in fact, two-thirds of the firm-averages lie outside a range of 0.41*s*. centred on the mean or median.[3] We get a similar picture from the differential based on timeworkers' average hourly earnings. Thus the mean of the firm-averages for fitters is 0.84*s*. above that for labourers; and yet over a third of the firm-averages lie outside a range of this size centred on the mean or median.[4]

(*ii*) *Some explanations and justifications*

Can these differences in wage levels between firms be justified? or do they call for a revision of the wage structure? Their prime justification, on grounds of equity, would be that they reflect differences between firms in respect of the average ability or effort of the labour employed. But it hardly seems plausible—at least within the narrow category with which we have been dealing and within single sections of the industry—that many groups of workers should be worth half as much again, or even up to twice as much, as other groups. Of course, the output per man-hour of different groups of workers might easily vary very much more than their earnings. But labour productivity is not related only—or even necessarily—to ability or effort: it may be primarily determined by managerial efficiency or degree of mechanisation, and may in any case be offset by high capital cost.

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[1] Assuming the maximum possible increase under the agreement of 1950 (*ibid*., p. 281 n. 1).

[2] The agreement of February 1956 has given nearly 3½*d*. an hour to skilled workers, but the semi-skilled received 3*d*. and the unskilled just over 2½*d*.

[3] If we centre this range on the mean (3.88*s*.) of the firm-averages of timeworking fitters' hourly earnings, we obtain an upper limit of 4.09*s*. and a lower limit of 3.68*s*. 29 per cent of the firms lie above the upper limit, and 37 per cent below the lower. If we centre the range on the median (3.81*s*.), the corresponding percentages are 34 and 31 respectively.

[4] If we centre this range on the fitters mean, we obtain an upper limit of 4.30*s*. and a lower limit of 3.46*s*. 17 per cent of the firms lie above the upper limit, and 19 per cent below the lower. If we centre the range on the median, the corresponding percentages are 20 and 14 respectively.

There are, however, other factors which generate wage differences. Thus such differences may be instituted or perpetuated in order to achieve a redistribution of labour; but because of the notorious imperfections of the labour market they may, in times of labour scarcity, have to be so big as to be indefensible on grounds of equity (and, if they fail to achieve their object, become pure anomalies). There are of course many other factors which influence a firm's wage policy. Most of these are associated either with the firm's capacity to pay (as determined by its market position and rate of profit) or with the workers' bargaining power (particularly at the shop-floor level). These result in wage differences which are difficult to justify on grounds of equity and which may or may not be defensible on economic grounds.

But while such factors as we have outlined undoubtedly influence the wage policies of firms, levels of earnings are by no means automatically responsive to every change which may occur. Wage relationships are founded on tradition and precedent: existing patterns of earnings are largely a legacy from the past, and may survive long after the factors originally responsible have ceased to be operative. Thus some wage differences, whether or not they may once have been justified, are by now anomalous.

If, as we suggested above, the inter-firm variability of earnings is exceptional in engineering, there are two possible explanations: first, that some of the factors responsible are exceptionally variable and diverse in engineering; second, that their effect on earnings is exceptionally great in this industry. On balance there is more to be said for the latter explanation, but it can be argued that, because of the heterogeneity of the various sections of the industry, the economic fortunes of different firms may be more diverse in engineering than in other industries (and that this may possibly lead to greater variability in output per man-hour). However, the effect on earnings of many of the factors we have been considering may well be stronger in engineering than elsewhere, because of the looseness of the central control over wages exercised by national collective bargaining.

National bargaining still accounts for the greater part of wage increases (for timeworking fitters, for example, it has accounted for about two-thirds since 1938). But the wage 'structure' is really a myth. For since the introduction of national bargaining, what has always been negotiated has been *changes* in wages and not *levels* of wages. National agreements, almost without exception, have provided for uniform wage changes for workers in all occupations. These changes have for the most part been made on a flat-rate basis; a few percentage changes were made during and after the first world war, and this type of wage change has returned to vogue recently. It is true that national minimum rates have been established for fitters and labourers (though only since 1948); and it is also true that the minimum rates of workers in one or two out of the multitude of other engineering occupations are related to those of fitters or labourers by separate national agreements. But, as we have seen, the variations between and within firms in supplementary payments are so large that the minima have little relevance to actual earnings levels, and consequently differentials in earnings become highly volatile. On the other hand all firms are obliged to increase the earnings of their workers by the amounts awarded under national agreements. Thus, while national collective bargaining has virtually no control over the pattern of earnings, it has a strong and direct influence on the total wage bill.

This absence of a nationally-agreed wage structure suggests that individual firms in engineering have a greater latitude in fixing wages than in other industries. In other words, the economic factors discussed above probably have a stronger impact on earnings, particularly when wages are rising. However, the flexibility of the system should not be overemphasised, as it is notoriously difficult to cut wages (almost impossible, under full employment), and changes in the patterns of earnings have to be achieved by catching up and not by falling back. (The uniform wage increases awarded by national agreement have, of course, no effect on existing inter-firm wage relationships.) Thus, as advances are consolidated, the earnings patterns exhibit considerable rigidity in the short run.

Theoretically, all wage differences could be attributed to the interplay of the various economic and institutional factors already referred to, and the existing pattern of earnings may be regarded as the product of a delicate self-adjusting mechanism which ought not to be tampered with. But there must be some element of chance and irrationality in inter-firm wage differences. For the existing pattern of earnings has arisen out of countless specific decisions; and in practice each decision is inevitably accompanied by a good deal of ignorance and uncertainty (and, incidentally, is virtually irreversible). For example, employers can hardly gauge the exact wage increase needed to secure an adequate supply of workers in a particular occupation; and, even supposing they could, they will also—if they are not to disrupt too much the traditional wage differentials within the firm—have to grant gratuitous increases to other categories of workers. Again, workers are generally unaware of the wages paid in more than a few other local firms; nor are the union officials often very much wiser.

But while inter-firm wage differences—apart from those which reflect differences in ability and effort—can be attributed to the sort of economic pressures we have been discussing, it does not follow that they are therefore necessarily justified. In order to justify these differences, it would have to be shown not only that the economic objectives underlying them were socially desirable, but also that they had proved just sufficient to achieve these objectives. While some of the objectives evidently satisfy this criterion, the use of (virtually) irrevocable wage increases to achieve them may sometimes be a vain gamble. But even if economic pressures always worked efficiently and in the right direction, there might still be a case on grounds of equity against the scale of inter-firm differences; and the greater the frictions and rigidities of the economic mechanism, the more likely is this scale to be extended and the greater is its vulnerability on grounds of welfare, of economics, and indeed of common sense.

In equity, there is undoubtedly a case against the existing scale of differences in earnings. For if equity considerations were the prime determinants of wages, then workers of equal ability expending equal effort should be paid at the same rate; and all differences in wages would be related to differences of ability and of effort.[1] But time payment—and we have been dealing mainly with timeworkers—is obviously not intended to reflect differences in effort, although for example certain forms of merit rating make some provision for rewarding intensity of work (as well as ability, length of service, and a string of domestic virtues such as good timekeeping and co-operativeness). On the other hand it can be argued that time payments should and do reflect differences of ability; and that, although we have been dealing with workers nominally belonging to a single occupation, these workers are highly heterogeneous in respect of the work they do and of the ability required of them. But the existing wage differences in engineering can hardly be rationalised on these grounds. For, as we showed above, the difference in payment between fitters in the highest-paying sixth of firms and those in the lowest-paying sixth is bigger than the average difference between the wages of fitters and labourers. Thus, in respect of fully a third of all firms, there are bigger inter-firm differences in the remuneration of skilled workers alone than there are on average between skilled and unskilled. However great the heterogeneity of skill and ability among fitters, it can hardly be so great that the differences in these respects between substantial proportions of them exceed the difference in skill and ability between the typical craftsman and the typical labourer. Given this, and given that the relationship between the average earnings of skilled and unskilled workers is held to be justified, then the scale of the differences in the remuneration of skilled workers cannot be justified.[1] A possible escape from this dilemma would be to argue that the difference between the average earnings of skilled and unskilled should be increased. This widening would have to be very considerable before the existing differences within the skilled grade could begin to be defended on grounds of equity. Moreover, as no workers' wages can be axed, any widening of the skill differential could be brought about only by pushing up the wages of the skilled to new heights. The alternative escape, which seems the more reasonable, would be to reduce the variability of earnings within individual occupations (particularly the more skilled occupations).

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[1] Jobs requiring particularly intensive effort cannot be held by older workers, so that those who do such jobs must expect to lose them long before their working lives are over. Thus the reward for effort is, in part, a compensation for insecurity and the prospect of a relatively early diminution in earning capacity. This aspect of the matter is probably less important for craftsmen, but more important for the unskilled (and possibly most important for semi-skilled workers on the production line, who must keep up with the pace). For manual workers as a whole, earnings tend to reach a peak about the age of 40, declining thereafter partly because workers have to accept less remunerative jobs; but peak earnings are reached earlier by the less skilled (*cf.* Harold Lydall, *The Life Cycle in Income, Saving, and Asset Ownership*, *Econometrica*, April 1955, pp. 140–142).

For in effect (if our premisses are valid) we are confronted with two inconsistent scales of remuneration: that within single occupations, and that between different occupations. If the overall narrowing of wage differences between occupations, which has been taking place over the years, can be adequately defended on economic grounds (for example, changes in the relative demand for skills due to changes in technology, etc.), then, on grounds of equity, wage differences within single occupations should be reduced accordingly; whereas the opposite has been happening in engineering, especially during the past two decades. A wage structure should presumably maintain equitable relationships between the wages of different categories of workers while at the same time affording some play to economic pressures. But the absence of such a structure in engineering has left so much play to these pressures that equity considerations seem to have been largely swamped.

(*iii*) *Extensiveness of the variability*

Since we have been dealing mainly with timeworking fitters, it may well be asked how much generality there is likely to be in our conclusions. There is, as we saw in Table VIII above, rather more variability in pieceworkers' earnings than in timeworkers'. While this is to be expected because pieceworkers' earnings are obviously more susceptible than timeworkers' to variations in output per man-hour, the variability from firm to firm of pieceworkers' average hourly earnings (as measured by the interquartile range) is barely a sixth greater. This comparison suggests that only a small part of the pieceworkers' variability may be due to differences in their productivity from firm to firm, and that most of it may derive from differences between firms in the pricing or timing of piecework jobs. Such differences (for example, in the prices paid per piece, or in the times allowed) amount in effect to differences in the implied hourly rates which men are paid on average—*i.e.*, to the same sort of wage differences as affect timeworkers. Incidentally, pieceworkers receive a substantial, and increasing, proportion of their earnings in the form of a straight hourly payment (originally the National Bonus)[2]; this amounted to as much as a shilling an hour in 1952, and some firms may well pay their pieceworkers a time payment larger than the minimum required by national agreement. Thus what we have said about the inter-firm variability of timeworkers' earnings seems likely to apply to pieceworkers also. After all, the control exercised by national agreement over the fixing of piecework prices and times (and, *a fortiori*, over pieceworkers' hourly earnings) is even looser than it is over timeworkers' rates of pay.

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[1] If the relationship between the minimum time rates of skilled and unskilled workers, instead of that between their average earnings, were used as a yardstick, the dilemma would be even more striking.

[1] For an account of the composition of pieceworkers' earnings, *v. The Structure of Engineering Earnings*, pp. 281–284. For the last 25 years, all increases to pieceworkers under national agreements have (except only in 1943 and 1950) simply been additions to the National Bonus or 'hourly payment'.

There is also the question of the extent of the variability of earnings for workers in other occupations. We have seen that for timeworking labourers it is smaller than for fitters; and this is reflected by a smaller rates/earnings gap. But for skilled grades other than fitters there is no reason to suppose that the inter-firm variability would be smaller than for fitters; indeed, the little evidence we have suggests that fitters are typical in this respect. As for the semi-skilled, who account for over a third of the industry's labour force, most are pieceworkers; and our figures again suggest a very considerable variability in earnings. After all, apart from fitters and labourers, very few occupations are catered for even nominally by national agreements.

Throughout this article we have been using averages of earnings for workers in particular firms; and we have to consider whether our conclusions would appear more, or less, cogent if data were available for individual workers. While, as we pointed out earlier, little can be inferred from the distribution of firm-averages of earnings about the shape of the distribution of the earnings of individual workers, we can nevertheless deduce something about the variability of individuals' earnings. Thus we can compile a hypothetical distribution of timeworking fitters' hourly earnings on the assumption that, within each firm, all workers in this category receive exactly the same pay per hour. This distribution is of the same general shape as the (unweighted) distribution of firm-averages which we have been using, although it is rather less regular. Because of the slight positive correlation between average hourly earnings and number of fitters, the mean of the hypothetical distribution (3.98*s.*) is slightly higher than that of the unweighted distribution (3.88*s.*); and the dispersion is also perceptibly greater. Whereas for the unweighted distribution the interquartile range is 0.60*s.* and the standard deviation is 0.49*s.*, the corresponding figures for the hypothetical distribution are 0.63*s.* and 0.53*s.* respectively. These may be used as minimum estimates: for it is clear that the measures of dispersion for the actual distribution of individual workers' earnings—if one were available—would certainly be greater, since any variations in the earnings of timeworking fitters within firms would necessarily increase the overall variability. Thus what we said about the 'swamping' of equity considerations seems to have even more force when we allow for the possibility of variation in earnings between workers within the same firm.

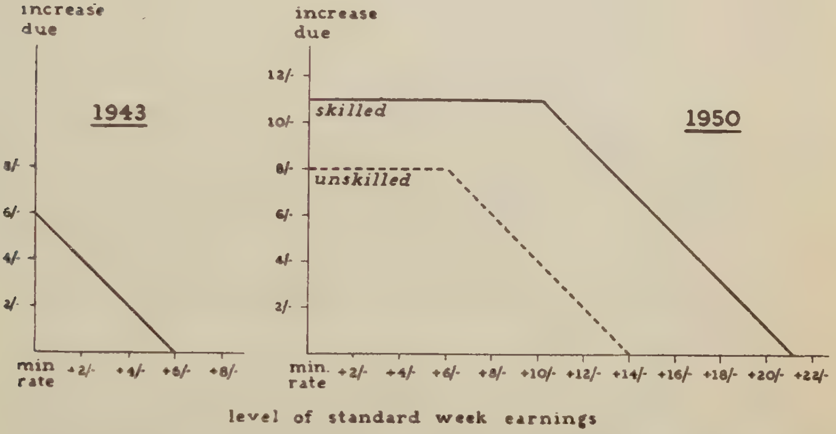
The main point emerging from the above discussion is that, for one reason or another, the variability of engineering earnings, especially within occupations, appears to have become excessive. We have suggested that the looseness of national control over wages is partly responsible for this state of affairs, and we should consider whether a brake can be applied, through national bargaining, to this increasing variability of earnings.

(*iv*) *Effects of national wage settlements*

Since the wage-cuts of 1922, virtually every wage settlement has provided for flat-rate increases. (The only two exceptions are the settlements of 1943 and 1950, which are of particular relevance to the present discussion and to which we shall shortly revert). Until recent years the increases prescribed have been identical for all grades; but, as in 1950, bigger increases were specified for skilled than for unskilled workers under the agreements of 1954, 1955, and 1956—these agreements incidentally setting a precedent by awarding intermediate amounts for the semi-skilled. These flat-rate increases, whether uniform or graded between skilled, unskilled and semi-skilled, have of course had the effect of raising district time rates (and, since 1948, the national minimum time rate); but they are essentially additions to earnings which apply automatically to every worker in the industry, and their simplicity in operation accounts for their continued popularity. But a consequence has been that wage changes, which may be argued primarily on a minority's claims (particularly the minority earning little or no more than the minimum rate), are granted indiscriminately to everyone. In other words, every rise in the minimum rate pushes up the maximum earning—and there is no upper limit—by an equal amount. Thus the total wage increase tends to be inflated, while the pattern of earnings is undisturbed.

But if our interpretation of the intra-occupational diversity of engineering earnings is correct, it is desirable to reduce this diversity ; and the simplest way of doing so is to adopt a system of graduated instead of flat-rate wage changes. For example, if during a period of rising wages each successive agreement were to award larger increases to the lower-paid than to the higher-paid within each occupation, there would be constant pressure over time to reduce the variability of earnings. This principle is not unknown in engineering wage agreements, although on the two occasions when it has been tried the total amounts involved were—by comparison with other wage advances—so small that the settlements proved very unpopular and the method has hardly been given a fair trial. In 1943, and again in 1950, wage increases were awarded on what was called a '*pro tanto*' basis; that is, they were related inversely to the individual's earnings. By the National Arbitration Award (No. 326) of 1943, the only workers to receive the full increase of 6*s.* were those whose earnings were no higher than their minimum district time rate; those whose earnings were between this and their new district minimum (6*s.* above their old minimum) were to receive graduated increases sufficient to bring them up to the new level; while those whose earnings were already above their new minimum were to receive nothing. In the agreement of 1950 (accepted by the unions only on the recommendation of the National Arbitration Tribunal) the principle was the same, although its working was a little more complicated. In the first place, as we mentioned above, the maximum increase for skilled workers (11*s.*) was greater than that for the unskilled (8*s.*). Secondly, the full 11*s.* increase for skilled was to be paid not only to those whose earnings[1] were no higher than their old minimum rate, but also to those whose earnings ranged up to 10*s.* above it; only at this level did the increases begin to taper off, up to the point where workers were earning 21*s.* above their old minimum—after which they were not entitled to anything at all. The arrangements for unskilled workers were similar, although the amounts involved were smaller. The way in which, under these two settlements, the prescribed increases were related to existing levels of earnings is illustrated in Diagram IV.[2]

IV. Working of 1943 and 1950 "pro tanto" settlements



It is not possible to state with any great degree of accuracy how many workers benefited from these agreements, or what were the total sums of money involved. But since in both years overall averages of earnings were well above the 'stop rates' (*i.e.*, the levels beyond which no increases were payable), it is to be presumed that only a minority of workers were entitled to the full increases. A Federation enquiry of 1950 showed that about 3 per cent of fitters and 13 per cent of labourers were earning no more than their respective national minima; but these figures included pieceworkers as well as timeworkers. However, some other limited evidence in our possession enables us to make rough estimates of the proportions of timeworking fitters and labourers who were earning both on and near their minima. On this basis we estimate that perhaps a fifth of timeworking fitters received the maximum increase, and another fifth received graded increases; and that the total amount received, if it had been spread over all timeworking fitters, would have been equivalent to a flat-rate increase of around 3*s*.[1] For timeworking labourers, the corresponding proportions were nearer a third in each case, and the equivalent flat-rate increase was perhaps about 4*s*. Thus, despite the fact that the minimum rate for fitters was raised by three shillings more than that for labourers, the labourers probably benefited more in aggregate from the 1950 *pro tanto* agreement, because a greater proportion of labourers than of fitters earn on or near their minimum. Moreover, the stop rate for pieceworkers was the same as that for timeworkers; so that, as their earnings were higher, they presumably fared even worse.

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[1] Excluding individual merit rates, and all overtime earnings (as in 1943).

[2] The above arrangements applied to timeworkers. We are not proposing to detail the corresponding arrangements for pieceworkers; but, while the Minimum Piecework Standard (*op. cit.*, pp. 281-284) was raised, no employer was obliged to increase piecework prices or times if earnings were already above the new level. Thus the *pro tanto* principle was applied to pieceworkers also.

The agreement was highly unpopular: 'I think it is true to say,' said Mr. Tanner in the course of presenting a fresh claim a year later, 'that that settlement has been the cause of more discontent among the workers, and hostility from them, than any wage settlement over the past 12 years. The chief reason, of course, was the fact that it did not provide for a general increase of wages. Only a minority of the workers derived any benefit from it, and most of the benefit they received has already disappeared as a result of the rapidly increasing cost of living.'[2] Certainly very few workers would have received the full increases—indeed, the majority of skilled workers do not seem to have been entitled to any increase at all. But it is difficult to say whether the hostility was mainly directed at graduated increases as such, or at the particular form of gradation adopted, or at the smallness of the sum which was awarded in total.

In principle it is difficult to reconcile an objection to graduated increases as such with the unions' reiterated concern for the living standards of workers earning no more than the bare minimum—the more so, as there are grounds for holding large intra-occupational differences in earnings to be inequitable. Obviously any workers' representative would prefer a flat-rate increase of x shillings to graduated increases with x shillings as the maximum; but these are hardly the real alternatives. If we think in terms of a given total sum which is to be awarded, the choice lies between a flat-rate increase of x shillings and graduated increases where the maximum will be larger than x shillings—possibly very much larger, according to the form of gradation adopted. For example, we estimated that the 1950 agreement offered the equivalent of a flat-rate increase of 3*s*. to skilled timeworkers and 4*s*. to the unskilled; and these are small in comparison with the respective maximum increases of 11*s*. and 8*s*. The total sum awarded was modest (as might have been expected at the end of the wage-freeze) compared with subsequent awards. But even if the total sum available had been no more than those awarded later, the maximum increases could well have been doubled—and, because the stop rates would have had to go up by corresponding amounts, the numbers of workers receiving some increase would in consequence have been substantially greater. In such a case, much of the discontent might have been avoided; but as it was, many firms were forced to grant compensatory increases in the months following the agreement.

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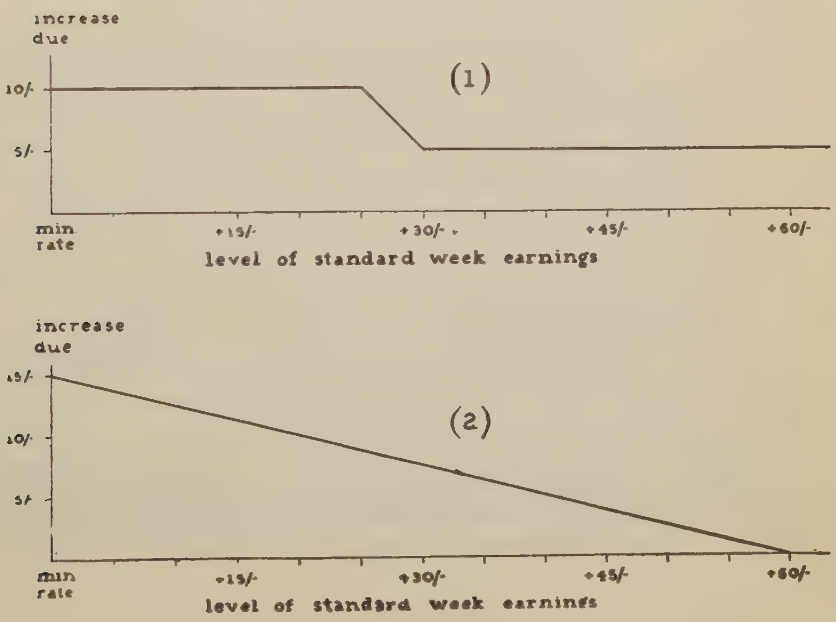
[1] It is impossible to make wholly reliable estimates, if only because we do not know the incidence and importance of individual merit rates

[2] *Proceedings at a Special Conference* (of unions and employers), 10th October, 1951, p. 2.

(*v*) *Possible alternative types of settlement*

If the principle of graduated increases is conceded, there are obviously many possible forms which a *pro tanto* agreement might take. The examples which have so far been tried, and which we illustrated in Diagram IV, have the disadvantage that the increases taper off abruptly. Indeed, under the 1943 agreement the increases began to taper off immediately, although the 1950 agreement admitted a small range of earnings (up to 10*s*. above the minimum for the skilled) within which increases were to be flat-rate. But this range could clearly be extended much further, so that only the very highest-paid received nothing. The operation of such an agreement might prove more palatable if the increases were not allowed to fall to zero for any worker, but simply to decline to a lower level for the higher-paid. This sort of arrangement is illustrated in Diagram V (1): graduated increases would apply, as before, only over a very small range of earnings, and the general effect would be to divide the workers into two large groups—each receiving a different flat-rate increase. Of course, if it were thought desirable, more stages could be incorporated, so that workers would be divided into three or more groups.

V. Working of hypothetical "pro tanto" agreements



The number of stages could, in fact, be increased indefinitely, so that the amount each worker received would be simply related inversely to his current earnings. Such an arrangement is illustrated in Diagram V (2). In this case, the amount to which any worker would be entitled would be equal to fifteen shillings *less* one-quarter of the difference between his standard-week earnings and the district minimum rate—workers earning sixty shillings or more above the minimum receiving nothing. Alternative formulae can easily be devised by choosing a different maximum and a different fraction: for example, the increases awarded could be equal to twenty shillings less one-fifth of the difference between standard-week earnings and minimum rate—in which case, only workers earning five pounds or more above the minimum would fail to qualify for an increase. The steepness of the gradation depends simply on the size of the fraction chosen: the smaller the fraction, the slower the rate of decline in the increases awarded and the more closely they approximate to flat-rate increases. Thus this type of agreement, by allowing for manipulation both of the maximum increase and of the steepness of the gradation, provides an extremely flexible instrument of policy.

Such arrangements would naturally be less simple to operate than the flat-rate increase; but one possible simplification would be to construct a table giving the increases appropriate to workers at any level of earnings. Table XII shows the working of the agreement illustrated by Diagram V (2); and it will be seen that, as the number of shillings by which a worker's earnings exceed the minimum rises, the amount of increase to which he is entitled is made to diminish by small and discrete steps instead of declining continuously as in the diagram.

TABLE XII

Working of Specimen 'Pro Tanto' Agreement

Excess of current standard-week[1] earnings over existing district time rate	*Increase due*
less than 1/–	15/–
1/– or over, but less than 2/–	14/9
2/– or over, but less than 3/–	14/6
3/– or over, but less than 4/–	14/3
. . . .	.
57/– or over, but less than 58/–	/9
58/– or over, but less than 59/–	/6
59/– or over, but less than 60/–	/3
60/– or over	none

[1] Excluding any craft differential and individual merit rate.

There are, however, several points to be noted. Since our object is to bring some pressure to bear on wage differences within occupations, the maximum increase fixed, and the particular gradation selected, could vary between occupational groups, and should be determined in the light of the earnings distributions within those groups[1] and of existing inter-group wage relationships. The necessary calculation of each worker's earnings could be done by the firm on an agreed basis—for instance, on the basis of his average standard-week earnings for the month preceding the agreement. Craft differentials and individual merit rates should, as in the previous *pro tanto* agreements, be deducted from earnings before assessing the increase due.[2] This would not mean a very severe burden on a firm's wages office. For it may be presumed that—for timeworkers at least—the standard-week earnings of different workers within single occupations do not vary very much in the same firm ; even if they did, the calculations involved would be very much more straightforward than those required by many existing bonus schemes. Moreover, calculations of bonus have to be carried out week after week; whereas for the last 15 years national agreements have not occurred more than once a year. Again, the effect of a succession of *pro tanto* increases would be to eliminate certain wage differences, and hence to simplify the work of the wages office in the long run.

But the large variations in earnings which we have observed between firms suggest that the main effect of *pro tanto* increases would be to reduce inter-firm differences rather than to interfere with the wage practices of particular firms. Obviously, the less variation there is within a firm in the remuneration of workers (in the same occupation), the less likely is any individual worker to feel aggrieved at the working of the agreement. In this connexion the ' gradualist ' type of agreement illustrated by Diagram V (2) and Table XII has distinct advantages. For whereas under an agreement like those of 1943 and 1950 the wage differences between some workers would have been wiped out at one stroke, under our specimen ' gradualist ' agreement no wage difference is reduced by more than a quarter.[3] In money terms, of course, the larger a difference is, the more rapidly it would diminish under the impact of a series of such agreements; and, conversely, the smaller it became the more slowly it would decline. Thus, if a worker's wages were only 5s. above his district minimum rate, the immediate effect of our specimen agreement would be to raise the minimum by 15*s*. and his wage by 13*s*. 9*d*.—thus reducing his lead from 5*s*. to 3*s*. 9*d*. A second similar agreement would reduce his lead to 3*s*.; and only after eight agreements of the same type would his lead have dwindled to 9*d*., so that he would in future be entitled to the maximum increase.

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[1] Although such distributions are rarely compiled at present, they ought to form the factual background to every wage negotiation. Nor would the necessary data be particularly difficult to collect from the existing records of firms.

[2] The reason for deducting individual merit rates is, of course, that it is undesirable to eliminate differences in earnings which reflect genuine differences in the quality of the worker. While individual merit rates cannot always be taken as the only indicators of special merit, the distinction between ' individual ' merit rates and those which are ' commonly applied ' (*i.e.* paid to all workers in a particular group) appears to be the only criterion which can reasonably be laid down in national agreements—although the distinction is sometimes hard to maintain in practice.

[3] It will have been observed that, in the first three *pro tanto* schemes discussed, there is a certain range within which the earnings of some workers draw level with those of others as a result of the increases awarded. None of the schemes results in any worker actually overtaking another—with the trivial exception that, when the increases are made to diminish in discrete steps as in Table XII, then of two workers whose current standard-week earnings happen to differ by less than 3*d*., the lower-paid may possibly be entitled to an increase 3*d*. greater than the other. The *maximum* overtaking possible is thus 2½*d*. on a week's earnings. No overtaking could take place unless the current earnings of the two workers concerned chanced to fall on either side of a shilling boundary in Table XII ; and, even if it occurred once, it could not recur since both workers would thereafter be entitled to the same increase under subsequent similar agreements. The maximum overtaking could, of course, be made as small as one pleased by using finer gradations than those suggested in Table XII ; but a remote possibility of one worker's weekly earnings overtaking those of another by as small a sum as 2½*d*. or less would seem to be sufficiently negligible. Even this is avoided, of course, if the exact formula—as stated on the previous page and illustrated in Diagram V (2)—is applied.

Of course, if the only wage changes in the industry were to be brought about in this way, in the course of time—and it would be a very long time—all wage differences within occupations would ultimately be reduced to less than a shilling. Such a prospect is absurd, if only because domestic bargaining and wage-fixing is going on all the time. Many wage differences, if they were found to be being whittled away by national agreements, would no doubt be maintained or re-established by local action. For there is no intention of freezing even the highest earnings; but equally there seems no point in pushing them up automatically and continually by national agreement. The prime purpose of our ' gradualist ' proposal is to bring all existing wage differences under regular review so that, in time, the anomalous and unjustified differences would be swallowed up by rising minimum rates.

(*vi*) *Problems arising*

We are putting forward these proposals against a background of rising wages, and it is perhaps to these conditions that the proposals are most appropriate. In an inflationary situation, graduated increases may seem desirable on two further grounds; firstly, that excessively large wage differences tend to breed wage claims; and secondly, that it may be possible to satisfy the reasonable claims of the unions at the cost of a smaller aggregate wage advance.[1] There is, however, an important objection to any system of increases graduated inversely in relation to current earnings, during a period of rising prices. It may be argued that, if the variability of earnings is to be reduced, this ought to be done without any worker losing in real terms. But the only way of preserving everyone's real earnings would be to grant everyone the same percentage increase (equal to the rise in the cost of living[2]); and in money terms this would be an inverted *pro tanto* increase, automatically widening differences in earnings. In practice, national increases justified on cost-of-living grounds are usually not intended to do more than to raise the *average* earnings in an occupation proportionately; and such a procedure cannot compensate the highest-paid adequately if the

[1] If there were ever to be a recession so severe that wage reductions were contemplated, the variability of earnings would almost certainly not increase ; from this point of view, therefore, it would be immaterial whether graduated or flat-rate cuts were made.

[2] Of course, the rise in the cost of living may itself, because of variation in consumption patterns, differ for different workers. For example, lower-paid workers generally spend a greater proportion of their incomes on food and, because food prices have risen so much more than other prices in recent years, the cost of living must have risen more for them than for the higher-paid.

increase is awarded on a flat-rate basis to all workers in the occupation. Obviously the more variation there is in earnings the more the higher-paid will tend to be under-compensated, and the lower-paid over-compensated, by a flat-rate increase geared to the average. However, despite a long series of nationally-awarded flat-rate increases within occupations, the variability of earnings—both in the short and in the long run—seems to have risen faster than the cost of living[1] as a result of local and domestic bargaining, so that differences in earnings have probably widened in real terms as well as in money terms. Thus it would appear that the higher-paid have proved quite capable of looking after themselves. Nevertheless, our system of *pro tanto* increases would give these workers practically no assistance from national agreements and, if prices had been rising rapidly, it might be thought justifiable to award a flat-rate increase as well. The relation between the flat-rate increase on the one hand and the *pro tanto* arrangements on the other would depend to some extent on the relative importance on the rise in the cost of living as against the other justifications for an advance in wages. If the cost of living is the prime justification, the percentage increase in the total wage bill should be related to the rise in the cost of living; but the total increase could still be distributed partly along *pro tanto* lines.

Whatever the movement of prices, another possible objection to a system of graduated increases is that even a flat-rate advance will automatically increase the share of the total wage bill going to the lower-paid workers.[2] Moreover, if we consider earnings after tax, the redistributive effect of a flat-rate increase is accentuated in terms of disposable income.[3] Indeed, if the only increases in wages were those awarded nationally, it might not be thought worth while to change from flat-rate to *pro tanto* increases, if only because of the additional difficulties involved. But it must be remembered that the granting of increases piecemeal by individual firms has resulted in wage rises comparable in importance with those achieved by national negotiation; and, as the growing dispersion of earnings has shown that domestic bargaining favours the higher-paid workers, it seems desirable that national agreements should be brought into play as a check.

The practical difficulties of applying national agreements of the *pro tanto* type should not be underestimated, although as these difficulties will vary from firm to firm it is impossible to anticipate them in detail. The difficulties arise simply from the diversity of the systems of payment which have proliferated so freely in the industry, so that by now the specific composition of workers' paypackets varies almost as much as do their earnings. Thus in one case a timeworker's paypacket will comprise his national minimum rate, with perhaps a merit rate, a lieu rate, and a bonus payment in addition; in another the firm will simply fix its own basic rate for him well above the minimum, without a façade of complicated incentive and compensatory payments. It is in cases of the former type—and they will be very common—that problems will arise under the kind of agreement we have been proposing. For, although the national minimum must go up by the maximum amount, a particular worker may be entitled to a smaller sum (or even to nothing at all); so that the difference—if the national minimum rate has to remain a separate and identifiable element in the worker's paypacket—must be deducted by the firm from its own supplementary payments. And it is easy to see that this will create difficulties. The alternative is to leave the national minimum rate unchanged, and to introduce a new '*pro tanto* payment' which can vary from worker to worker. This will, of course, not mean that the worker loses the protection of a national minimum, but simply that this is now a *national minimum earning*, below which no worker's hourly earnings could fall. (This national minimum earning would, in fact, be equal to the present national minimum rate plus the maximum payments awarded under all subsequent *pro tanto* agreements[1].) Thus, so far as the minimum is concerned, all we are proposing is a change in nomenclature, in order to make the actual application of *pro tanto* agreements simple and unambiguous no matter how complex the methods of wage payment happen to be in particular firms.[2]

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[1] We may take the gap between average standard-week earnings and minimum rates as a rough indicator of the variability of earnings. For fitters at least (both on timework and on piecework), this gap increased two or three times as fast as the cost of living between 1938 and 1952, and nearly twice as fast between 1948 and 1952.

[2] It is sometimes said that flat-rate increases have favoured the lower-paid workers because prices have been rising. Of course, a flat-rate increase must give the lower-paid a bigger share of aggregate wages, quite independently of price movements; whereas differences in earnings, both in money and in real terms, are not affected by a flat-rate increase—and again, price movements are immaterial.

[3] If the unions were out to maximise the aggregate wage increase, they could not ignore the effect of progressive taxation; and *pro tanto* increases would undoubtedly leave their members with a greater aggregate of disposable income than would a flat-rate advance of equal pre-tax aggregate amount.

There would be no special difficulty in applying a *pro tanto* agreement of this type to pieceworkers. The appropriate '*pro tanto* payment' would simply be added to the hourly payment which pieceworkers already receive under current agreements, and there would be no need to recalculate piecework prices or times. (The Minimum Piecework Standard would, of course, be equal to the present Minimum Piecework Standard plus the maximum *pro tanto* increases granted under subsequent agreements.) The effect of recent agreements has been to increase the proportion of straight time payment in pieceworkers' earnings, and our present proposals would continue this process. The progressive 'dilution' of pieceworkers' earnings in this way may be deplored by those who believe that piecework prices and times can be fixed objectively and equitably, and that workers respond appropriately to payment by results; but these things, as the Americans are aware, are by no means proven. Rapid mechanisation creates the problem of continually revising piecework prices and times, if earnings are not to be grossly inflated and established differentials within the firm distorted. Loose piecework pricing (intentional or unintentional), which is not uncommon, leads to excessive variability in earnings not only for the pieceworkers themselves but probably also—in the course of time, through the operation of lieu rates—for timeworkers.[1]

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[1] Overtime and shift premia would be calculated on the current national minimum earning.

[2] Any firm can, of course, streamline its systems of wage payment by consolidation—as some have already done. If, as we have suggested above, most of the variation in the hourly earnings of workers in single occupations occurs between rather than within firms, consolidation would not present severe technical difficulties.

Throughout this discussion we have been considering how to reduce the variability of hourly earnings within individual occupations. We have not been concerned with the relative levels of earnings in different occupations, except to suggest that intra-occupational differences have become too great to be consistent with the skill differential as it now stands. But there is obviously a difficulty in applying *pro tanto* agreements to the earnings of workers in occupations where there are no nationally-agreed wage relationships with the rates of fitters or labourers—and such occupations probably cover a majority of workers in the industry. The difficulty is to know what is the appropriate district time rate on the basis of which the '*pro tanto* payment' is to be calculated. For the relationship between the rate for a particular occupation and the fitter's (or labourer's) rate may be peculiar to a district or to an individual firm; moreover, the difference between the rates will in practice be treated as tantamount either to a craft differential or to a 'commonly applied' merit rate. Thus the variability of the relationship on the one hand, and the ambiguity about its interpretation on the other, will mean that a *pro tanto* agreement may operate unfairly as between workers in the same occupation but in different firms. In consequence, such agreements might fail, for these occupations, to achieve their prime purpose of substantially reducing inter-firm variability in earnings.

The only satisfactory solution would be to introduce a few more grades of skill, and then to secure an agreed classification of all occupations within this framework. This would be a formidable, but clearly not impossible task[2]; and a case could be made for undertaking it irrespectively of the type of wage change in vogue. Once the grading had been completed, it would be necessary to fix a minimum rate (or minimum standard-week earning) for each of the half-dozen or so grades. It would then be possible to determine the appropriate *pro tanto* increase quite simply for workers in any occupation. Moreover, a series of *pro tanto* increases would bring earnings relationships progressively into line with the structure of rates; and this is surely the most practicable way of introducing an effective rates structure into the industry, since it would not involve any drastic and wholesale revision of wages.

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[1] In the light of these and other considerations, Vauxhall Motors have recently replaced their bonus payments by a consolidated time rate, thus bringing their practice into line with that of their parent company (General Motors) and of the U.S. motor industry generally. (*Cf. The Financial Times*, March 22nd, 1956).

[2] The National Coal Board, for example, has undertaken a comprehensive grading of thousands of occupations as a preliminary to redesigning the industry's wage structure. A case was in fact made for a similar grading in the engineering industry, but the negotiations resulted in no more than the establishment of national minimum rates for fitters and labourers in 1948.

Because of the heterogeneity of the industry, it might be thought desirable to institute separate negotiations for each of the main sections (for example, aircraft, electrical engineering, vehicles, foundries, and so on). But this would mean a great complication of collective bargaining procedure and, in an inflationary situation, could easily lead to a self-perpetuating round of wage claims within the industry. Moreover, it would at best provide merely a pseudo-rationalisation for existing differences between the average earnings of different sections; it would not affect the variability of earnings within sections, which, as we pointed out above, can be as great as or even greater than for the industry as a whole. Indeed, to reduce this variability would in any case require a series of *pro tanto* agreements of the kind we have suggested—for each of the separate sections. On balance, therefore, there seems little point in recommending the atomisation of collective bargaining.

However, any departure from the established practices of the engineering industry is certain to provoke some hostility. The sort of arrangements we suggest will obviously be opposed from two quarters at least: workers receiving high wages and employers paying low wages. Although neither of these groups is on very strong ground, both can undoubtedly make trouble. On the other hand, under present arrangements the other two groups —workers receiving low wages and firms paying high wages—have as much cause to complain, and considerably more justification for doing so. Under any system, there are bound to be divergent interests within the ranks of both workers and employers. The unions cater, of course, for both high- and low-paid workers within occupations. The high-paid workers, however, while they may be dissatisfied with a *pro tanto* arrangement, are still free to bargain independently, and there is still full latitude for arguing cases on their merits. Nevertheless, the acceptance of the *pro tanto* principle by unions and employers must ensure that the mere failure to benefit from a national agreement would in itself be no ground for claiming an advance; otherwise the whole purpose of the present proposals would obviously be defeated. But the divergence of interest has a more immediate practical importance for the employers, since the Federation is organised in such a way as to give each firm a separate voice[1] when a national wage change is under negotiation. The result may be that the Federation's decisions on national wage changes are based on what the less prosperous firms maintain is the most they can afford to pay.[2] Indeed, no matter what wage increase may be proposed,

[1] Voting rights in the Federation are determined by the size of firms' wage-bills. But although the aggregate voting strength of one half of the member firms amounts to no more than about 6 or 7 per cent of the total (*cf.* Table I above), the Federation cannot afford to ignore the possibility of secession by firms if they are dissatisfied. On the other hand, secession may not solve the problem for such firms, since non-Federated firms are by no means immune from pressure to conform with the minimum standards accepted by the Federation.

[2] An American observer has recently commented on this. 'At most the system [of industry-wide collective bargaining] established a national floor which was significant primarily for the "marginal firms" and the less profitable industries. It meant that general wage increases in engineering were geared to a level which the less profitable and less progressive industries could tolerate . . .' Milton Derber, *Labor-Management Relations at the Plant Level under Industry-Wide Bargaining: A Study of the Engineering (Metal-Working) Industry in Birmingham, England*; University of Illinois, 1955, p. 96.

there will at all times be a minority of firms protesting their inability to pay. But the size of this minority is only one of the factors which the Federation has to consider before deciding on a specific answer to the claims of the unions. In any case, the inability to afford an increase at a particular time is not necessarily confined to the lowest-paying firms,[1] and under our proposals a firm which was paying relatively high wages (but was also paying as much as it could afford) would not be penalised so much by having to pay a *pro tanto* increase as it would be by having to pay a flat-rate increase. Of course, *pro tanto* increases would penalise the low-wage firms, and indeed they are in a sense—on grounds of equity—intended to do so. Moreover, in so far as the low-wage firms tend to be the less efficient, there are good economic grounds during a period of full employment for bringing pressure to bear upon them.

In practice, therefore, it is obvious that a *pro tanto* scheme would, on a variety of grounds, be more difficult to operate than a system of flat-rate increases, and would generate a certain amount of friction. But any technical difficulties would certainly be transitory, and it is not unreasonable to hope that resistance would be short-lived. That the awarding of successive wage increases on the *pro tanto* principle is a practical possibility has already been demonstrated in the coal industry,[2] despite its background of militant trade unionism. Ever since nationalisation, the Coal Board (with the general approval of the union) has raised the wages of lower-paid workers in particular occupations—by fixing, in each agreement, earnings 'ceilings' above which no increases are payable. But while this method has, as we have seen, been adopted in engineering on two separate occasions, in coal-mining it has been employed systematically and, apparently, with success.[3] It is certainly simpler to administer than the 'gradualist' scheme we have outlined, although the latter has the possible advantage of compressing almost all wage differences between workers on each occasion without eliminating any of these differences outright. If the need to introduce an effective wage structure in engineering—or at least to reduce the excessive variability of earnings—is admitted, the most obvious method is a succession of *pro tanto* settlements; and, of the two general types of settlement which we have been discussing, the 'gradualist' is the less drastic and therefore probably the more palatable.

[1] Indeed, owing to the present recession in the motor trade, some of the highest-earnings firms throughout the whole of the engineering industry are perhaps the least able to afford an increase in wages.

[2] 'There was substantial overlapping of rates from the lowest to the highest grades and the variations in wage rates for a given job far exceeded the differences between average wage rates for jobs of different kinds. In short, there was a complete absence of the clear cut differentials between jobs and grades required for a rational wage structure' (*National Coal Board Report for 1955*, p. 38). In so far as coal-mining is, compared with engineering, a fairly homogeneous industry, there is even less reason to tolerate wide differences in wages, at any rate within occupational groups.

[3] Its effectiveness in reducing wage dispersion is indicated by the fact that already in 1951, after only three *pro tanto* agreements, the minima had caught up with the wages of well over half the timeworkers in the industry.

SMALL MANUFACTURING BUSINESSES

ACCOUNTING INFORMATION FROM A PILOT SURVEY[1]

By James A. Bates and Michael Stewart

In an earlier issue of The Bulletin[2] there appeared a preliminary report on a pilot survey of small manufacturing business carried out in January and February 1955. This survey was concerned with a small sample of firms in the Birmingham area, and was restricted to manufacturing businesses with between 10 and 250 employees.

The Survey had two main objectives : one was the collection of accounts; the other was the filling in of the background against which the accounts must be interpreted. This background information was derived from interviews with businessmen, conducted by means of a questionnaire. The previous article was concerned in the main with the background data (which is of considerable interest in itself) and discussed questions of size and growth, ownership, profitability, market structure and finance. The present article is concerned with the accounting information, interpreted where possible in the light of the information derived from the questionnaire.

At one stage in the interview, businessmen were asked questions about their accounts. Of a sample of 148 firms, 68 firms (46 per cent) gave some accounting information, and a further 22 answered most of the questions. Half of the businessmen giving accounting information gave the entire balance sheets and profit and loss accounts (either to be copied down on the spot or later); the other half gave answers to a series of questions designed to find out the general structure. Some firms gave one year's accounts, others gave two; but in some cases the details were found to be inadequate.

I. BALANCE SHEETS

By James A. Bates

Of 68 firms which gave some financial data, only 41 gave balance sheets which were sufficiently accurate to show in detail the structure of the balance sheet, the sources of new finance and the uses to which it was put between 1952 and 1953. Although it is not possible to draw many general conclusions from such a small sample it is nevertheless interesting to look at the figures and to consider the possibilities of this type of approach.

Briefly, the balance sheet is a conventional annual summary of the financial position of the business, presented in the form of a statement of the *liabilities* and *assets* of the firm. The *liabilities* may be divided into capital account and current liabilities. In the *capital account* are included shares, reserves (including reserves for future taxation) and the balance carried forward from the profit and loss account : this total is sometimes referred to as the *equity* of the firm, or as *capital and reserves*, and may be interpreted as belonging to the shareholders. To the non-accountant it is often confusing to see reserves and balance from profit and loss account treated as liabilities, but if they are considered as liabilities to the shareholders themselves, the position is clear. The main items of *current liabilities* are loans and accounts payable (creditors), and generally speaking current liabilities are debts owed outside the firm as such.

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[1] The pilot survey was conducted, and the previous article written, by Colin Bruce, F. A. Burchardt and E. B. Gibb, and we are greatly indebted to them for much of the groundwork of the present article. However we are wholly responsible for the method of presenting the information and for the interpretations put upon it.

We should also once again like to express our thanks to Mr. J. E. Critchley for the help he gave us with accounting problems.

[2] Bulletin, Vol 17, No. 3, August 1955.

Assets are divided into fixed and current assets. Under the heading *fixed assets* the two main items are land and buildings and plant and machinery : a 'gross' figure is given, showing what was originally paid for the assets, and a cumulative figure for depreciation allowed on these assets is also given.[1] *Current assets* are divided into *stocks* (of finished goods and materials) and work in progress ; investments;[2] accounts receivable (or debtors), and cash at bank and in hand. Thus the assets side of the balance sheet can be seen as representing the fixed and working capital of the firm ; the liabilities side represents liabilities incurred in financing the business.

Aggregate balance sheet

It is convenient first to consider the aggregate balance sheet of our 41 firms, and to follow this with a more detailed analysis of some individual items and of characteristics of firms. Many potentially significant relationships cannot, of course, be examined here : this is purely a matter of the size of the sample and the very wide variety of experience in our firms; but in a pilot survey it is sufficient to point the way and to look at a few of the salient features of the balance sheets, without carrying the examination or speculation too far.

Balance sheets are notable for their heterogeneity, but it is possible to reduce them all to a simplified standard form without too much loss of significant detail, and to aggregate these standard forms. A collective balance sheet of this type does, of course, obscure some important features, and may exaggerate the importance of others. Because of the heavy weight of the largest firms, the use of averages may be misleading, and open to the danger of being interpreted as typical or in some way representative. It is more convenient for our purposes to use aggregates, and to show directly the influence of individual firms by looking at significant features of these firms, and to comment on distributions of different items.

The capital account of the firm is that part directly owned by the shareholders : this item was in aggregate nearly seventy per cent of the total liabilities of our firms. The most important item of current liabilities is

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[1] This is provided under the Companies Act of 1948, subject to certain exceptions. These exceptions mean that it is not always possible to tell whether the gross figure does actually represent what was originally paid.

[2] Trade investments, where they occur, are better treated as fixed assets of the firm. In our firms however, the investments were marketable securities, which are treated as current assets.

TABLE I

Aggregate Balance Sheet (41 Firms)

LIABILITIES		£'000		% of Total
	1952	*Change*	*1953*	*(1953)*
Shares	559	+ 85	644	23
Total Reserves	702	− 29	673	23
Balance from Profit and Loss Account	467	+ 72	539	20
Total Capital Account	1,728	+128	1,856	68
Loans : *Directors*	*30*	*+ 4*	*34*	
Banks	*40*	*− 22*	*18*	
Others	*76*	*+ 20*	*96*	
Total Loans	146	+ 2	148	5
Creditors	509	+ 36	545	20
Current Tax	121	− 4	117	
Dividends	39	+ 1	40	
Other Liabilities	13	+ 1	14	
Total Current Account	828	+ 36	864	32
Total Liabilities	2,556	+164	2,720	

ASSETS		£'000		% of Total
	1952	*Change*	*1953*	*(1953)*
Land and Buildings	449	+ 1	450	17
Plant and Machinery	443	+ 28	471	17
Total Fixed Assets	892	+ 29	921	34
Investments : *Government*	*17*	*− 0*	*17*	
Industrial	*2*	*+ 5*	*7*	
Others	*31*	*+ 22*	*53*	
Total Investments	50	+ 27	77	3
Stocks	765	+ 21	786	29
Debtors	610	− 47	563	21
Cash	229	+139	368	13
Other Assets	10	− 5	5	
Total Current Assets	1,664	+135	1,799	66
Total Assets	2,556	+164	2,720	

credit given by the firms' suppliers (or accounts payable), which accounts for more than 60 per cent of current liabilities and 20 per cent of total liabilities. Loans as a whole are rather a small item, accounting for about 5 per cent of total liabilities and 15 per cent of current liabilities. Nineteen firms did not show current tax and dividends in the Balance Sheet. There is a variety of reasons for this : some firms did not pay dividends or tax; in some cases the accounting year ended at the same time as the tax year, and no tax provision was necessary; while some firms include such liabilities under the head ' creditors '. Where a firm does not give an appropriation account, it is not always possible to tell how much is put by for tax and dividends, but any difference between profit on the profit and loss account and the balance carried to the balance sheet represents net appropriations and adjustments, of which tax and dividends form part. Any estimation of tax and dividends from such material would not be very satisfactory; and as the quantitative significance of any such adjustments is slight, no attempt has been made to impute tax and dividends.

On the other side of the balance sheet fixed assets, net of depreciation, are roughly one-third of the total, and are divided fairly evenly between buildings and plant. Stocks are an important item of current assets, and are almost as big as fixed assets. Credit given to customers (' debtors ' or ' accounts receivable ') roughly balances that given by suppliers on the liabilities side. Cash accounts for the bulk of the remainder.

Comparison with published accounts

Before commenting on these items in detail, it is interesting to compare the aggregate balance sheet of Pilot Survey firms with *The Economist* quarterly analysis of published balance sheets of public companies. To do this it is necessary to re-classify both sets of data into a comparable form : this results in some further loss of detail and involves some arbitrary decisions, but any such difficulties are not very serious.

There is a remarkable similarity between the two sets of data in Table II. Capital account corresponds fairly closely, but reserves are rather smaller in *The Economist* than in the Survey firms. The loans position is very different in the two groups, and debentures, a very insignificant item in the balance sheet of Survey firms, are quite important in *The Economist* firms. Debentures are less likely to be a desirable form of finance for small businesses, because of the strong fixed debt (and sometimes mortgage) element, and because small businesses are less likely to be able to offer the necessary security for the issue of debentures. The costs of a debenture issue might also be proportionately too high for the smaller sums usually needed for the finance of small businesses. Other loans are a heterogeneous group, and are slightly higher in Survey firms. Unfortunately, for one of the more interesting topics in this section (Creditors) there are no comparable figures of much value : *The Economist* analysis simply mentions ' Creditors and Current Liabilities ', and the two cannot be separated. Whatever the reason, the

TABLE II

Comparison of 'Economist' and Pilot Survey Balance Sheets, 1953

LIABILITIES	*2,781 firms Economist*		*41 firms Pilot Survey*	
	£ 000	*% of Total*	*£ 000*	*% of Total*
Shares	3,077,824	26.5	644	23.7
Total Reserves ...	1,922,368	16.6	673	24.7
P. and L. Balance	2,498,690	21.5	539	19.8
Capital Account ...	7,498,882	64.6	1,856	68.2
Loans	*386,587*	*3.3*	*145*	*5.3*
Debentures ...	*913,791*	*7.9*	*2*	*0.1*
Total Loans ...	1,300,378	11.2	147	5.4
Creditors, etc. ...	2,802,504	24.2	717	26.4
Current Liabilities ...	4,102,882	35.4	864	31.8
Total Liabilities ...	11,601,764	100.0	2,720	100.0

ASSETS	*2,781 firms Economist*		*41 firms Pilot Survey*	
	£ 000	*% of Total*	*£ 000*	*% of Total*
Fixed Assets	3,798,047	32.7	921	33.9
Stocks	3,028,321	26.1	786	28.9
Debtors	1,797,349	15.5	563	20.7
Total Investments	1,516,774	13.1	77	2.8
Cash	1,178,082	10.2	368	13.5
Other Assets ...	283,191	2.4	5	0.2
Current Assets ...	7,803,717	67.3	1,799	66.1
Total Assets ...	11,601,764	100.0	2,720	100.0

figure is slightly higher for Pilot Survey firms than for *The Economist* firms.

On the assets side also there is a fairly close correspondence between the various proportions. Fixed assets, net of depreciation, are very similar; stocks are slightly larger, but investments are very considerably smaller in Pilot Survey firms. This simply means that *The Economist* firms have a tendency to keep rather more of their financial assets in the form of investments : this is what one would expect, *a priori*, since, the larger are current assets in absolute terms, the more likelihood is there that more of them will be kept in a form which will yield interest and still be safe and fairly liquid; smaller firms, with smaller absolute resources, would not have so much to spare to keep in investments and might also be tempted to keep the money in the firm, possibly as cash or stocks. Moreover in *The Economist* firms this figure includes investments in subsidiaries, an item which is likely to be of far more weight in large than small firms. Debtors are rather more important in Survey than *The Economist* firms : this may be partly due to the fact that smaller firms are not always able to press very hard for repayment of debts, and partly because they often work on a contract and 'parts' basis, where perhaps the lag between completion and payment is rather long.[1]

But these comparisons cannot be pushed too far. With a very small sample, it is always possible that unusual behaviour by one large firm might distort an aggregate balance sheet, and the proportions might be misleading if they were taken as representative of individual firms. It is therefore necessary to examine the accounts in far more detail. Where it is the case that two or three firms have unduly influenced the aggregates, and where, after taking into account the influence of these firms it was found that the items were not of sufficient interest to merit detailed description and analysis, the items and distributions have been shown in the appropriate tables without comment in the text.

Three size groups, defined in terms of total assets (or liabilities), are used in subsequent size classifications for balance sheets : up to and including £24,999; £25,000 to £99,999; and £100,000 and over. There are 19, 12 and 10 firms in each category respectively.

Ownership characteristics also may influence certain balance sheet items, and certain potentially significant categories may be distinguished. Thus, the sample may be divided in three different ways as follows :

A. i *Family Firms:* firms in which all the shares are held by members of one family.

ii *Non-Family Firms:* all firms not included in Definition Ai.

B. i *Family Majority Firms:* firms in which a majority of the shares is held by members of one family.

ii *Non-Family Majority Firms:* firms in which no one family holds a majority of the shares (*i.e.* all firms not included in Definition B.i).

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[1] Fuller discussion of these matters appears later. See p. 155.

C. i *Family Director Firms:* firms in which all directors are members of one family.

ii *Non-Family Director Firms:* all firms not included in Definition C. i.

Distribution of these firms is shown in Table III, from which it can be seen that most of our firms are by any reasonable definition family firms.[1] This means that generalisations about ownership characteristics must be treated with caution.

TABLE III

Ownership by Assets Size Groups

Assets Size (£)	A i Family firms	A ii Non family firms	B i Family majority firms	B ii Non family majority firms	C i Family director firms	C ii Non family director firms	Ownership not known
0—24,999	11	8	18	1	13	6	—
25—99,999	5	6	9	2	5	6	1
100,000 and over ...	—	8	6	2	2	6	2
All firms	16	22	33	5	20	18	3

Groups Ai, Aii, Bi and Ci are the groups used in subsequent analysis, distributions of firms in groups Bii and Cii being omitted.

Liabilities

Table IV shows the main balance sheet items of liabilities as proportions of total liabilities, distributed by size groups. Capital account, which constituted 68 per cent of total liabilities in the aggregate balance sheet, ranged between 6 per cent and just over 90 per cent of total liabilities in individual firms, but in two-thirds of the firms it was between 60 per cent and 89 per cent. Table IV appears to indicate a slight tendency for larger firms to rely more on their own capital resources to finance assets: in the smallest size group only 6 out of 19 of the firms have capital account more than 70 per cent of total liabilities, whereas two-thirds of those in the other groups are above 70 per cent.

It might perhaps be supposed that family firms would tend to rely more on their own resources for finance, but the statistics of Table V cannot be said to support such a hypothesis. In every ownership group about half of the firms have capital account over 70 per cent of total liabilities. On the other hand, of 6 firms with capital account less than 50 per cent of total liabilities, 5 are non-family firms.

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[1] 64 out of 84 firms in the whole sample were family majority firms ; 32 of these were firms fully owned by one family. (See BULLETIN, August 1955, p. 254, Table IV.)

TABLE IV

Balance Sheet Items as Percentages of Total Liabilities

Assets size group[1]	*Percentage of Total Liabilities* 0	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–100	*All firms*
Capital Account												
I		1	1	—	1	—	5	5	5	1	—	19
II		—	—	1	—	1	1	1	3	4	1	12
III		1	—	—	—	1	1	1	1	4	1	10
All Firms ...		2	1	1	1	2	7	7	9	9	2	41
Loans												
I	4	3	8	2	1	1						19
II	4	5	—	2	1	—						12
III	8	1	—	1	—	—						10
All Firms ...	16	9	8	5	2	1						41
Directors' Loans												
I	7	4	6	—	2							19
II	7	3	1	1	—							12
III	10	—	—	—	—							10
All Firms ...	24	7	7	1	2							41
Creditors ...												
I		1	4	9	3	—	1	—	1[2]	—	—	19
II		3	5	3	—	1	—	—	—	—	—	12
III		3	4	—	1	1	—	—	—	—	1[3]	10
All Firms ...		7	13	12	4	2	1	—	1	—	1	41

[1] Size group I = £0–24,999.
Size group II = £25–99,999.
Size group III = £100,000 and over.

[2] This firm increased its creditors considerably between 1952 and 1953.

[3] The firm whose creditors were over 90 per cent of total liabilities is one whose current account was 92.9 per cent of total liabilities, and whose fixed assets were only 1.4 per cent of total assets.

TABLE V

Capital Account by Ownership Groups

Form of Ownership		*Capital Account as percentage of Total Liabilities* 0–29	30–49	50–59	60–69	70–79	80–89	90–100	*Total*
Family Firms ...	...	1	—	3	4	4	4	—	16
Non-Family Firms ...	...	3	2	3	3	5	4	2	22
All Firms	...	4	2	6	7	9	8	2	38
Family Director Firms	...	2	—	4	5	4	4	1	20
Family Majority Firms	...	4	2	5	7	7	6	2	33

The two principal sources of outside finance shown on the balance sheet are loans and creditors. Loans account in the aggregate for 17 per cent of current liabilities, but there is a fairly wide dispersion, and 16 out of 41 firms did not show any loans on their balance sheet at all. Table IV lends some support to the contention that smaller firms finance less of their business from their own resources, and tend to have larger loans than the bigger firms (8 out of 10 of which had no loans whatever). But it is possible to split loans rather more finely than this, as balance sheets distinguish between bank loans, directors' loans and other loans.

Directors' loans[1] are bigger in family firms than in non-family firms in aggregate but, understandably, size has some influence, since in larger firms directors' loans can only make a smaller proportional contribution to financial needs than in smaller firms. The influence of size can be seen from Table VI and the full size distribution in Table IV : in fact, in the smallest size group, non-family firms had a higher proportion of directors' loans than did family firms. Twenty-four firms had no directors' loans at all, and none of the firms in the biggest size group had any directors' loans. In only three firms can directors' loans be said to be very important.

TABLE VI

Directors' Loans as Percentage of Total Liabilities

Form of Ownership	*Assets size (£)*	*1952*	*No. of firms*	*1953*
Family Firms	0–24,999	5.6	*11*	5.7
	25–99,999	3.0	*5*	4.5
All Family Firms ...		3,8	*16*	4.9
Non-Family Firms ...	0–24,999	11.1	*8*	12.4
	25–99,999	2.4	*6*	2.4
	100,000 and over	0	*8*	0
All Non-family firms ...		0.8	*22*	0.8
Family Director Firms		1.7	*20*	2.2

In firms with directors all members of one family, directors' loans were only 2.2 per cent of total liabilities in 1953. But there is a fairly wide dispersion, shown in Table VII. It may seem surprising that in these firms directors' loans should be so small. But 16 of the 20 family director firms were also entirely owned by members of the family, and in these cases virtually the whole of capital account can be construed as belonging to the family, and the *need* for extra finance in the form of directors' loans might be less.

Bank loans also are only a small proportion of total liabilities in most firms. Thirty-three out of 41 firms did not show any bank loans on the balance sheet at all, and only in 4 firms did they account for more than 5 per cent of total liabilities. These figures cannot be said to reflect lack of creditworthiness of small firms, as many of the small firms may simply not have wanted to borrow from banks. But ' window-dressing 'might affect the figures and

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[1] It may be argued that directors' loans are not outside finance at all But, inasmuch as they are not directly owed to the firm as a corporate entity, but to individuals connected with the firm, they are not strictly internal finance. But any distinction is a matter of convenience.

TABLE VII

Directors' Loans in Family Director Firms, 1953

Assets size (£)	Directors' Loans as percentage of Total Liabilities 0	0–4	5–9	10–14	15 & over
0—24,999	5	2	—	5	1
25—99,999	3	—	1	1	—
100,000 and over	2	—	—	—	—
All Firms	10	2	1	6	1

in addition, since these are only figures for the end of a financial year, they may not reflect the typical position of the firm throughout the year, particularly in trades in which bank loans and overdrafts are used to finance seasonal fluctuations and where, as is often the case in such trades, balance sheet accounting dates are chosen to coincide with slack periods. The quantitative effect of these considerations cannot be estimated with any accuracy from balance sheet data alone.

These figures of loans are in no way a commentary on the comparative ease with which small and large, or family and non-family, firms can get access to any extra finance which they may need. Balance sheet figures give no indication of this, and for such analyses it is necessary to go back to the questionnaire for questions specifically designed for this purpose.[1] In this connection it is interesting to note that balance sheet figures shed new light on the analysis of sources and uses of finance in the previous article.[2] The previous analysis gave the impression that bank loans and directors' loans were the most important source of external finance[3]; the present analysis shows that in aggregate as a proportion of total liabilities they are not very important. The two sets of figures do not, of course, mean the same thing (the question on which the earlier analysis was based asked whether the business had, at any time in the period 1947 to 1953, used any of a number of sources of finance) and it is obvious that neither set presents the whole picture, but there are significant differences between the implications of the present quantitative data and the implications of the previous analysis. The explanation lies partly in the differences in coverage, and partly in the fact that the earlier figures include any loans or overdrafts during the period 1947 to 1953, however small, and for however short a time, and many of the loans mentioned obviously will not appear on the balance sheet at all.

This is one reason why a fairly detailed analysis of loans is of more interest than the balance sheet proportions suggest. It is interesting to distinguish between the *frequency* of loans (as in the previous article) and the *weight* of loans, and to weigh one against the other. A completely false picture may be obtained as a result of considering one aspect in isolation.[1]

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[1] BULLETIN, August 1955, pp. 271 ff.

[2] *Ibid.*, p. 272.

[3] ' Only two sources, directors' loans and overdrafts, were used by a high proportion of the firms. . . . Just over half of our 82 firms raised all their finance either from profits or from some person or firm already connected with the business ; while 39 used some other sources and among these 35 used overdrafts. It would seem, from our sample, that small firms, with very few exceptions, either finance themselves from their own private resources . . . or borrow on overdrafts from the bank.' *Ibid.* p. 272–3. See also *ibid.* Table XXXI, p. 272.

The most important item of current liabilities in aggregate is ' creditors ', which accounted for 20 per cent of total liabilities and 63 per cent of current liabilities in 1953. Again, this hides a wide dispersion,, as can be seen from Table IV. In the smallest size-group 14 out of 19 firms received credit from their suppliers[2] amounting to more than 20 per cent of their liabilities, and only one-third of firms in larger size groups had credit at that level. Studies in the United States [3] have shown that creditors tend to be a higher proportion of total liabilities in small than in large businesses, and also tend to be high in certain trades (*e.g.* motor cars and the manufacture of parts.) But in our small sample it is not possible to detect any such relationship.

Assets

Table VIII shows the main items of assets as proportions of total assets, distributed by size groups, in a similar manner to liabilities proportions in Table IV.

Fixed assets, net of depreciation, were 34 per cent of the total assets of our firms in 1953. There are some difficulties in the interpretation of this figure, since 15 firms rent their land and buildings, but the difficulties are not serious.[4] There is a wide dispersion, and it may seem rather surprising that 9 firms had fixed assets of more than 50 per cent of total assets, but these are due mainly to high land and building figures.[5] In aggregate plant and machinery are about 20 per cent of total assets, and in over three-quarters of the firms are under 30 per cent. Almost all of those with plant and machinery above 30 per cent of total assets own no land and buildings.

Stocks account in total for 29 per cent of total assets. It has to be remembered that this figure includes stocks of materials, work in progress, and stocks of finished goods, and it is not possible to distinguish adequately between these items for our firms.[6] As the values quoted are book values, and as valuation methods differ from firm to firm, inter-firm comparisons are difficult.[7] Thus, a high stock figure for one firm might be due to a high proportion of work in progress, or to high material stocks, or simply to the

[1] It is debatable whether, in this connection, the absolute loans figure at a point of time, or the change in loans, is the significant quantity. The question which provided the data for the previous figures was phrased in terms of new finance, and so the change in loans might be significant. Changes are analysed later (see p. 160) but only two years can be given, whereas the frequency distribution refers to five years. But the change data do not show a very different picture from the above figures.

[2] This item includes (where applicable) : ' Prepayments on account of uncompleted contracts.'

[3] See A. R. Koch : *The Financing of Large Corporations, 1920–1939* (National Bureau of Economic Research, New York, 1943), p. 73, and references there.

[4] It is possible to allow for this by examining fixed assets less land and buildings. Such calculations were carried out, but little of significance emerged.

[5] Land and buildings are about the same size in the aggregate balance sheet as plant, but, as 15 firms rented premises, these proportions are generally bigger for individual firms.

[6] Some of our firms gave the stocks figure split up, but there were not many of them.

[7] This difficulty applies to many items on the assets side of the balance sheet.

TABLE VIII

Balance Sheet Items as Proportions of Total Assets

Assets size group	*Percentage of Total Assets*											*All*
	0	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–100	
Fixed Assets												
I		1	6	2	4	2	3	—	1			19
II		—	3	3	2	2	2	—	—			12
III		1	—	4	—	2	3	—	—			10
All Firms		2	9	9	6	6	8	—	1			41
Plant and Machinery												
I		2	7	3	5	1	—	—	1			19
II		2	7	3	—	—	—	—	—			12
III		2	4	3	1	—	—	—	—			10
All Firms		6	18	9	6	1	—	—	1			41
Stocks												
I		6	3	4	5	1	—	—	—	—		19
II		3	5	1	2	1	—	—	—	—		12
III		1	2	3	2	—	—	1	—	1		10
All Firms		10	10	8	9	2	—	1	—	1		41
Cash												
I		10[1]	4	3	1	1						19
II		5	3	3	1	—						12
III		4	4	1	—	1						10
All Firms		19	11	7	2	2						41
Investments												
All Firms	24	11	4	2								41
Current Assets												
I				1	—	1	3	4	3	5	2	19
II				—	—	1	3	1	4	3		12
III				—	—	3	2	—	4	1		10
All Firms				1	—	5	8	5	11	9	2	41
Physical Assets[2]												
I			1	1	1	6	4	4	2	—		19
II			1	—	1	4	2	3	1	—		12
III			—	—	—	—	3	3	2	2		10
All Firms			2	1	2	10	9	10	5	2		41

[1] Nine firms had cash less than 3 per cent of total assets; 16 had cash less than 5 per cent.
[2] Fixed Assets plus Stocks (at Balance Sheet Values).

method of valuation in a time of fluctuating prices. Table IX shows the distribution of stocks by trade : size and trade seem to have little influence on size of stocks, but of course this table does not really give us a fine enough industrial classification, and there are insufficient firms to justify a finer breakdown.

Debtors are an important item in our firms, accounting for 21 per cent of total assets, and 31 per cent of current assets in 1953. There is a fairly wide spread, but with a cluster round the 10–30 per cent mark. Seven out of the 10 largest firms have debtors less than 20 per cent of total assets, whereas in the other two size groups the proportions are 4 out of 19 (smallest size group) and 4 out of 12 (middle size group).

There is a fairly wide dispersion of cash as a percentage of total assets, two firms having over 40 per cent in 1953. But in both of these extreme cases it was probably due to chance circumstances, one of the firms having increased its cash from 16 per cent in 1952 to 42 per cent in 1953, the other having increased from 21 per cent to 40 per cent.

Table IX

Stocks by Trades Groups

Standard Industrial Classification Order[1]	*Percentage of Total Assets*						*All firms*
	0–9	10–19	20–29	30–39	40–49	50 and over	
III, IV and V	—	2	1	1	—	—	4
VI	2	2	—	2	—	1	7
VII	—	—	1	1	—	—	2
VIII	7	3	3	4	2	1	20
X, XIII, XIV, XV and XVI	1	3	3	1	—	—	8

[1] III. Treatment of non-metalliferous mining products other than coal.
IV. Chemicals and Allied Trades.
V. Metal manufacture.
VI. Engineering, Shipbuilding and Electrical Goods.
VII. Vehicles.
VIII. Metal Goods not elsewhere specified.
X. Textiles.
XIII. Food, Drink and Tobacco.
XIV. Manufactures of Wood and Cork.
XV. Paper and Printing.
XVI. Other Manufacturing Business.

But we must not lose sight of the fact that there is considerable substitutability among the various components of current assets. Just as all the current liabilities can, if needed, be used to finance a firm's activity, so can the finance available be shifted around fairly readily among various items of liquid assets,[1] and the actual utilisation of the money will depend on such things as the trend of prices of stocks, the level of activity of the firm, etc.; and the position at any one arbitrary accounting date may not be a reflection of some ' average ' or typical position of the firm.[2] The current assets position as a whole can be seen from Table VIII.

It is also possible to distinguish between ' real ' and ' financial ' capital, defining real capital as fixed assets plus stocks.[3] In aggregate real assets were 63 per cent of total assets in 1953 (59 per cent in *The Economist* firms) but there is naturally a fairly wide dispersion, as can be seen from Table VIII. All the firms in the largest size group had real assets of more than

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[1] Investments are probably not so convenient from this point of view.

[2] In addition, as was noted earlier (p. 150), the fact that accounting dates are often chosen for slack periods, or for some such reason, would make the figures even less likely to show a typical position.

[3] In other words, physical assets as distinct from financial assets.

50 per cent of total assets whereas in half of the firms in the smallest group they were less than 50 per cent. This apparent tendency for smaller firms to keep a lot of their assets in financial form is not easily explained : it is partly due to the high proportion of debtors in small firms, and partly due to the fact that some firms rent land and buildings (thus making fixed assets a smaller proportion of the total); but there may be other factors.

Other balance sheet relationships

The relationship of creditors to debtors is also very interesting, and there is a fairly close correspondence between the two in the aggregate balance sheet. It is often necessary for a firm to finance its customers by allowing credit, and it is common for businesses to use ' creditors ' as a source of liquid capital; in some respects the one may be considered as financing the other. Creditors can be a convenient source of current funds, if not necessarily a cheap one, as non-payment of accounts payable often involves the foregoing of cash discounts; but it is no doubt possible in theory to balance accounts payable and receivable against each other, and to balance loss of discounts from creditors against similar eventual payments from customers.

In the smaller size groups three-quarters of the firms gave more credit than they received by these measures, and in the largest size group 6 out of 10 firms gave less credit than they got. The aggregate position may be seen from Table X and the dispersion in Table XI.

TABLE X

Aggregate Creditor/Debtor Position by Size Groups, 1953

Assets size (£)	*Creditors*	*Debtors*	*Difference*[1]
0—24,999	46,347	57,738	— 11,391
25—99,999	109,974	182,347	— 72,373
100,000 and over	388,996	321,935	+ 67,061

[1] Net credit received minus net credit given.

TABLE XI

Creditor/Debtor Position as Percentage of Total Liabilities, 1953

Assets Size (£)	*Net credit received*[1]							*Net credit given*[2]							
	30 & over	25–29	20–24	15–19	10–14	5–9	0–4	0–4	5–9	10–14	15–19	20–24	25–29	30 & over	*All firms*
0–24,999 ...	1	—	—	—	1	—	2	6	2	2	4	—	1	—	19
25–99,999 ...	—	—	—	—	—	—	2	1	2	1	2	3	1	—	12
100,000 and over	1[3]	—	1	—	—	2	2	—	2	2	—	—	—	—	10
All Firms	2	—	1	—	1	2	6	7	6	5	6	3	2	—	41

[1] Net credit received—creditors exceed debtors.
[2] Net credit given—debtors exceed creditors.
[3] 81.9 per cent.

It seems rather surprising at first glance to find that small firms are in a position to give credit (net) by these measures.[1] It is possible that the giving of credit by most of the smallest firms, and by 29 out of a total of 41 firms, can be considered as a form of competition.[1] And the fact that accounts receivable exceed accounts payable does not of course detract from the importance of creditors as a source of capital—presumably the ' credit-financing ' of customers in this way is an essential part of the business, and if funds could not be acquired from creditors, then the increased ' sales finance '[2] would have to be acquired from some other source. It might be expected that debtors would slightly exceed creditors : the value added to materials within the firm might partly account for this, since, given the same time lag between payments for purchases and receipts from sales, *ceteris paribus*, the value of sales on credit would probably tend to exceed the value of purchases on credit.[3]

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[1] It is interesting to note that one or two of our businessmen, in general comments towards the end of the interview, made remarks to the effect that life would be far simpler for small businesses if bigger businesses were to settle their accounts more promptly.

The ratio of ' creditors ' to ' debtors ' shown in Table XII, although it does not show the significance of the difference in terms of total liabilities, does show the relative significance of the two items to each other.

TABLE XII
Percentage Ratio of Creditors to Debtors

Assets size (£)	0–29	30–49	50–99	100–149	150–199	200 and over	*All firms*
0—24,999	—	—	14	4	—	1	19
25—99,999	1	2	7	2	—	—	12
100,000 and over	—	2	2	2	2	2[1]	10
All Firms	1	4	23	8	2	3	41

[1] One of these firms had a ratio of 767 per cent in 1952, and 1071 per cent in 1953.

It is not, of course, possible to distinguish on the balance sheet between sources of finance used for fixed and working capital. Measures such as current assets less current liabilities[4] are sometimes used to denote the split between fixed and current capital (the difference between the two, current assets being usually the larger, coming from capital and reserves rather than from current liabilities). Such measures do not tell us very much in detail, as stocks are often financed in large part from capital and reserves, whereas some stocks are financed from current liabilities such as loans and creditors, and some debtors are financed from creditors, some from loans, and so on. We can never really say which source was put to which use.

Sources and uses of finance

Having examined the position of our firms at a point of time[5] the next step is to examine the changes in the balance sheets between 1952 and 1953.

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[1] But this could probably be shown just as effectively from the debtor position alone.

[2] *I.e.* the finance of customer credit.

[3] But so many disturbing elements exist that no precise relationship could be calculated. A fluctuating time lag between payments for purchases and receipts from sales would probably further complicate the issue.

[4] Sometimes referred to as Net Working Capital.

[5] Differences in accounting dates mean that an aggregate balance sheet for 1953 really covers balance sheets with accounting years ending between June 1953 and June 1954. A quarterly analysis would have been interesting, but the smallness of the sample ruled this out.

The 'static' position in 1953 shows the cumulative effect of the raising, repayment and use of finance between the foundation dates of the firms and 1953; it is also interesting to see what changes took place in one particular year, as this gives a general picture of sources of finance used (or repaid), and the uses to which the finance was put in a period of twelve months. [1]

In aggregate, capital account increased between 1952 and 1953 by £128,000. As none of the firms raised any *new* share capital[2] this increase may be treated as representing the change in internal resources of our 41 firms.[3] The size of this figure emphasises how much these firms depended on profits for new finance. Over the year from all sources, liabilities show an increase of £164,000, and retained profits made up 78 per cent of this sum. Loan finance in total was virtually unchanged, but bank loans fell by £22,000 whilst other loans increased by £20,000. (The decrease in bank loans was due largely to one firm reducing this item by £12,000; the increase in other loans to an increase in one firm of £18,000.)

The other important source of finance was an increase in credit from suppliers of £36,000, allied with a reduction in debtors on the assets side of £48,000. Thus, in aggregate, these 41 firms improved their net creditor/debtor position by £84,000

On the assets side, fixed assets increased by £29,000; £28,000 of this was in the form of increases in plant and machinery[4]; investments increased by £27,000 (£20,000 of which was by one firm); stocks increased by £21,000 (3 large firms increased stocks by £22,000, £21,000 and £24,000 respectively; and 2 other firms decreased stocks by £12,000 and £23,000 respectively); cash was increased by £139,000 (3 firms increased their cash holdings by a total of £112,000). The increase in fixed assets plus stocks[5] was £50,000; the increase in financial assets (cash plus investments) was £166,000.

Thus, compared with a total increase in liabilities of £164,000, assets increased by £216,000 (the increase composed as in the previous paragraph). The residual was financed by corresponding decreases on the assets side (£48,000 in debtors, and £5,000 in other assets). It is not possible to say much more than this with any accuracy—we cannot say, for example, how the £128,000 retained profit was disposed of on the assets side; neither can we say how any material investment was financed. One or two items in individual firms give us clues as to what happened: for example in one firm stocks (and work in progress) were increased by £20,000, and debtors were reduced by £20,000—one *might* have financed the other; in this firm, creditors were also increased by £23,000, bank loans were reduced by £12,000, and cash increased by £43,000. A few tentative deductions are possible in the case of such individual firms, but it would be invalid to proceed from such an analysis to similar analysis of an aggregate balance sheet, as conflicting tendencies within the aggregate would probably invalidate any conclusions which might be drawn.

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[1] The limitations of this sort of analysis will become apparent as this section proceeds.

[2] It is known from inspection of the Balance Sheets that the share increase of £85,000 was in fact capitalisation of reserves.

[3] The difference between this figure and retained profit is that the latter represents amounts retained from the year's earnings, whereas changes in internal resources can include items from previous years, such as taxation adjustments, which have only come into the balance sheet in the current accounting year. In survey firms differences between the two amounts are not significant, and it is reasonable for present purposes to label changes in internal resources as retained profits.

[4] Net of depreciation.

[5] *I.e.* net increase in real (or physical) assets (after depreciation) as defined previously (see p. 153).

Despite the drawbacks of this aggregate type of analysis, however, it is interesting to look briefly at one or two more aggregate figures before proceeding to a more detailed analysis.

There seem, on the face of it, to be one or two significant differences between firms which increased total assets and those which decreased total assets[1] (See Table XIII); but these differences might well be due to big changes in one or two firms.

Firms decreasing assets were mostly firms with small profits (compared with firms increasing assets), and the capital account of these firms increased by £6,000, whilst virtually all other items on the liabilities side decreased: loans by £4,000 (bank loans by £3,000), creditors by £24,000, reserves by £7,000. On the assets side, there was an increase in plant and machinery of £10,000, a fall in land and buildings of £5,000 (due in part to compulsory purchase), and increase in investments of £22,000 (£20,000 of which was due to one firm), a fall in stocks of £23,000 (this was widespread and not due to any one firm), a fall in debtors of £20,000 (again fairly widespread, but with one firm accounting for over half of the total), and a fall in cash of £18,000 (nearly £15,000 of which was due to one firm).

The picture in firms increasing assets is rather different. Retained profits accounted for 61 per cent of the increase in liabilities; bank loans fell by £16,000, but other loans increased by £19,000 (one firm increased other loans by £18,000—this was an increase in ‘ amount owing to other Group Companies ’). Creditors increased by £60,000, one firm accounting for £23,000 of this. On the assets side, plant and machinery showed a comparatively small net increase of £18,000, there was a small but insignificant change in investments, and a big increase in stocks of £44,000 (2 firms accounted for £44,000 but there were many small movements in both directions). Debtors fell by £28,000 (the same two firms who increased stocks by £44,000 decreased debtors by £39,000, but again there were many small movements in other directions in other firms). The biggest increase (£157,000) was in cash (£92,000 of this was due to two firms, and another £44,000 to three other firms—but the increase in cash was fairly general).

Thus, the experiences of the two groups of firms were vastly different, and the only experiences common to both were increases in plant and machinery and reduction of debtors. One would, of course, expect that firms in the two groups would differ to some extent, as large increases or

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[1] It is not intended to suggest that increasing or decreasing assets can be treated as synonymous with growth or decline over such a short period as this.

TABLE XIII

A. Aggregate Balance Sheet of Firms Increasing Total Assets 1952–3

(26 firms)
£'000

LIABILITIES	*1952*	*Change*	*1953*
Shares	422	82	504
Reserves	532	−21	511
Profit and Loss Balance	409	61	470
Capital Account	1,363	122	1,485
Loans : *Directors*	*21*	3	*24*
Banks	*23*	*−16*	*7*
Others	*56*	*19*	*75*
Total Loans	100	6	106
Creditors	304	60	364
Current Tax	97	10	107
Dividends	37	0	37
Other Liabilities	10	3	13
Current Account	548	79	627
Total Liabilities	1,911	201	2,112

ASSETS	*1952*	*Change*	*1953*
Land and Buildings	375	6	381
Plant and Machinery	337	18	355
Fixed Assets	712	24	736
Investments : *Government*	*17*	*0*	*17*
Industrial	*2*	*5*	*7*
Other	*27*	*0*	*27*
Total Investments	46	5	51
Stocks	554	44	598
Debtors	434	−27	407
Cash	159	157	316
Other Assets	6	−2	4
Current Assets	1,199	177	1,376
Total Assets	1,911	201	2,112

TABLE XIII (*continued*)

B. Aggregate Balance Sheet of Firms Decreasing Total Assets, 1952–3

(15 firms)
£'000

LIABILITIES	*1952*	*Change*	*1953*
Shares	137	3	140
Reserves	170	—8	162
Profit and Loss Account	58	11	69
Capital Account	365	6	371
Loans: *Directors*	*9*	*1*	*10*
Banks	*17*	*−6*	*11*
Others	*20*	*1*	*21*
Total Loans	46	−4	42
Creditors	205	−24	181
Current Tax	24	−14	10
Dividends	2	1	3
Other Liabilities	3	−2	1
Current Account	280	−43	237
Total Liabilities	645	−37	608

ASSETS	*1952*	*Change*	*1953*
Land and Buildings	74	−5	69
Plant and Machinery	106	10	116
Fixed Assets	180	+5	185
Investments: *Government*	—	—	—
Industrial	—	—	—
Other	*4*	*22*	*26*
Total Investments	4	22	26
Stocks	211	−23	188
Debtors	176	−20	156
Cash	70	−18	52
Other Assets	4	−3	1
Current Assets	465	−42	423
Total Assets	645	−37	608

decreases in particular items in industrial firms would obviously change total assets and liabilities in the same direction; but equally one would expect that there might be compensating changes in other items in many cases (*e.g.* if cash fell, this might be due to an increase in stocks, and the net change in total assets might be small). And, as we have seen already, error can be great in such a small sample, and big changes in one or two firms affect aggregate figures considerably.

Thus, the next step is to look at the differences between individual firms and between types of firms, from which it will be seen that generalisations about aggregate balance sheets do not necessarily present a true picture of the behaviour of firms.

Liabilities

The percentage increase in capital account over 1952 in the aggregate balance sheet was 7.3 per cent. The distribution round this average is fairly symmetrical, 29 firms showing an increase between 0 and 30 per cent. Nine of the firms decreased capital account, all being in the two smallest size groups. Of 15 firms who decreased total assets 6 also decreased capital account; and in general, firms decreasing total assets had smaller retained profits than firms increasing total assets.[1]

Thirteen of our firms did not take any new loans, another 13 decreased total loans, and 6 more increased loans by less than 9 per cent. Ten out of 15 firms decreasing assets either reduced loans or kept them constant; 16 out of 26 firms increasing assets did the same. These changes are widely distributed over all size groups.

The two most significant items of loans from our point of view are bank loans and directors' loans, analysed in Table XV. The changes in directors' loans are obviously of little significance : 6 of the smallest firms increased directors' loans, but 11 kept them constant. Of the biggest firms only one changed directors' loans, and that was a repayment. Nine of the firms reduced bank loans, 6 of them being in the smallest size group, but 27 firms did not change this source of finance at all. Only 5 firms increased bank loans, one of them (in the largest size group) by 100 per cent. In general, this brief analysis supports our earlier conclusion that loans in aggregate were of little significance to our firms, and as a source of *new* finance between 1952 and 1953 were unimportant.

The aggregate increase in creditors over 1952 was 6.1 per cent. For firms increasing assets it was 20 per cent, and in firms decreasing assets, creditors were reduced by 12 per cent. As a percentage of the total increase in liabilities in all firms it was 22 per cent; it was 30 per cent of the total increase in firms increasing assets, and 67 per cent of the total decrease in firms decreasing assets. In the smallest size group, 8 out of 11 firms which increased assets also increased creditors (5 of them by over 30 per cent); of the firms in this

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[1] One firm increased capital account by over 50 per cent—this was due to an increase in profit and loss balance of £2,000 ; another decreased capital account by 93.7 per cent —this was due to a fall in profit and loss balance of £2,000.

TABLE XIV

Changes in Liabilities as Percentage of Liabilities in 1952

Assets Size Group	*Decrease*						*Increase*					
	100	50–99	30–49	10–29	0–9	0	0–9	10–29	30–49	50–99	100 & over	*All firms*
Capital Account												
Firms increasing assets												
I					2	—	2	5	1	1	—	11
II					1	—	2	3	1	—	—	7
III					—	—	6	2	—	—	—	8
All firms increasing assets					3	—	10	10	2	1	—	26
Firms decreasing assets ...												
I		1	—	2	1	—	3	1				8
II		—	—	—	2	—	2	1				5
III		—	—	—	—	—	1	1				2
All firms decreasing assets		1		2	3	—	6	3				15
All Firms		1		2	6	—	16	13	2	1		41
Loans												
Firms increasing assets ...	2	2	1	2	—	9	3	1	5	1		26
Firms decreasing assets ...	2	1	2	1	—	4	3	1	—	1		15
All Firms	4	3	3	3	—	13	6	2	5	2		41
Creditors												
Firms increasing assets												
I			1	2	—	—	1	2	1	3	1	11
II			1	—	1	—	1	1	—	3	—	7
III			1	—	2	—	1	1	2	—	1	8
All firms increasing assets			3	2	3	—	3	4	3	6	2	26
Firms decreasing assets												
I		2	1	2	2	—	—	1	—	—	—	8
II		—	2	2	—	—	—	—	—	1	—	5
III		1	—	—	1	—	—	—	—	—	—	2
All firms decreasing assets		3	3	4	3	—	—	1	—	1	—	15
All Firms		3	6	6	6	—	3	5	3	7	2	41
Current Liabilities												
Firms increasing assets ...		—	—	3	4	—	6	8	4	1	—	26
Firms decreasing assets ...		2	3	5	2	—	—	2	—	1	—	15
All Firms		2	3	8	6	—	6	10	4	2	—	41

size group which decreased assets, only one increased creditors. This distinction between firms increasing and decreasing assets is quite pronounced and is seen in all size groups (of 26 firms which increased assets, 8 decreased creditors; of 15 firms which decreased assets, 13 decreased creditors). It is difficult to determine the causal significance of this : it may simply be that the decrease in creditors largely *caused* the decrease in liabilities (and assets),

TABLE XV

Changes in Directors' Loans and Bank Loans

	Change in loans as percentage of loans in 1952									
	Decrease					*Increase*				
	100	50–99	20–49	0–19	0	0–19	20–49	50–99	100 &	*All*
Directors' Loans ...	1	2	—	2	26	5	2	3	—	41
Bank Loans ...	6	1	2	—	27	2	1	1	1	41

and that firms decreased assets because they had to settle some accounts payable on the liabilities side. Or perhaps, having decreased debtors, they were *able* to settle more accounts.

The percentage change in current liabilities as a whole can be seen from Table XIV. The increase in the aggregate balance sheet was 4.4 per cent of the 1952 figure, but this hides a wide dispersion. There is, as would be expected, a strong correlation between firms increasing their total assets and firms increasing their current account.

Assets

The assets side of the balance sheet represents the utilisation of the funds raised on the liabilities side; but in addition it is obviously possible to increase some assets by reducing others (*i.e.* some changes in assets may be compensated by opposite changes in others without there being any necessity to ' raise funds ' on the liabilities side of the balance sheet).

The aggregate increase in fixed assets[1] between 1952 and 1953 was 3.3 per cent. Bearing in mind the proviso that these are book values, which are subject to different practices with regard to allowances for depreciation Table XVI shows some interesting characteristics. Twenty-two firms decreased fixed assets, 21 of them by varying amounts up to 29 per cent. Fourteen of these were in the smallest size group, and these were evenly spread between firms increasing and decreasing total assets. Most of the increases in fixed assets were, therefore, in the two bigger size groups, and mostly in those firms which increased total assets. The picture is not significantly different if we exclude land and buildings and merely take changes in plant and machinery.

Stocks increased in aggregate by 2.8 per cent between 1952 and 1953, but there were many negative changes in individual firms. Twenty-three of the firms decreased stocks, but most of the reductions were not more than 30 per cent, and similarly 11 out of 18 increases were less than 30 per cent. It is interesting that 15 out of 18 firms which increased stocks were firms increasing total assets; whilst only 3 of the firms which decreased total assets increased stocks. Causal significance cannot be determined from balance sheet data : any reduction in total assets can fairly quickly take place in stocks or cash, but whether or not the decrease in stocks caused the net

[1] Net of depreciation.

TABLE XVI

Changes in Assets as Percentage of Assets in 1952

Assets Size Group	*Decrease*						*Increase*					*All Firms*
	100	50–99	30–49	10–29	0–9	0	0–9	10–29	30–49	50–99	100 & over	
Fixed Assets												
Firms increasing assets												
I				5	2	—	—	3	1	—		11
II				—	3	—	2	2	—	—		7
III				1	1	—	3	3	—	—		8
All firms increasing assets				6	6	—	5	8	1	—		26
Firms decreasing assets												
I			1	3	3	—	—	—	1	—		8
II			—	—	2	—	—	2	—	1		5
III			—	1	—	—	1	—	—	—		2
All firms decreasing assets			1	4	5	—	1	2	1	1		15
All Firms			1	10	11	—	6	10	2	1		41
Plant and Machinery												
Firms increasing assets ...				5	7	—	6	6	2	—		26
Firms decreasing assets ...				5	4	—	2	2	1	1		15
All Firms				10	11	—	8	8	3	1		41
Stocks												
Firms increasing assets ...		—	2	7	2	—	5	4	5	—	1	26
Firms decreasing assets ...		4	1	5	2	—	1	1	1	—	—	15
All Firms		4	3	12	4	—	6	5	6	—	1	41
All Investments	1	—	—	2	—	29	2	—	1	1	5[1]	41
Debtors												
Firms increasing assets ...		—	2	5	7	—	3	4	2	2	1	26
Firms decreasing assets ...		2	3	1	2	—	2	3	2	—	—	15
All Firms		2	5	6	9	—	5	7	4	2	1	41
Cash												
Firms increasing assets ...	1	—	1	4	—	1	2	1	2	1	13	26
Firms decreasing assets ...	1	3	4	1	—	1	1	1	—	—	3	15
All Firms	2	3	5	5	—	2	3	2	2	1	16	41
Physical Assets												
Firms increasing assets ...			—	4	6	—	9	5	2	—		26
Firms decreasing assets ...			3	4	5	—	1	2	—	—		15
All Firms			3	8	11	—	10	7	2	—		41
Current Assets												
Firms increasing assets ...			—	—	1	—	9	10	5	1		26
Firms decreasing assets ...			2	7	4	—	2	—	—	—		15
All Firms			2	7	5	—	11	10	5	1		41

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[1] Four of these increased from £0 ; one to £250 ; another to £500 ; another to £1,822 ; another to £20,000.

decrease in total assets we do not know; and stock reductions may be due to factors not directly connected with the running and level of activity of the business.[1]

The change in real, or physical assets (total fixed assets plus stocks) during the period is also shown in Table XVI. The aggregate balance sheet shows an increase in this item of 3.4 per cent; firms increasing total assets increased real assets by 5.5 per cent; firms decreasing total assets reduced real assets by 4.8 per cent. Nineteen firms increased and 22 decreased real assets; 21 of the firms come in the range between a 9 per cent increase and a 9 per cent decrease. Sixteen out of 19 firms which increased real assets were in the 'increasing total assets' group; of 15 firms decreasing total assets, 12 decreased real assets. These changes cannot be said to represent net investment as understood by the economist, but they are as near as it is possible to get from the balance sheet information which we have. Size has little influence, and a size distribution is not presented.

In aggregate, debtors decreased by 7.9 per cent between 1952 and 1953. A decrease in debtors must, of course, be interpreted as an increase in financial resources becoming available, or as allowing some other increase in assets. Fourteen out of 26 firms which increased assets reduced debtors, and 8 out of 15 firms which decreased total assets reduced debtors.

As was noted earlier, cash showed the most significant increase in the aggregate balance sheet—an increase of 61 per cent over 1952. Nine of the 15 firms which reduced cash balances were in the smallest size group. As 81 per cent of the cash increase was by 3 firms, it would be wrong to interpret the large cash increase as an undesirable accumulation of liquid assets by our firms.

TABLE XVII

Change in Current Assets as Percentage of Change in Total Assets, 1952–3

Assets Size group (£)	*Opposite direction*	0–49	50–99	100–199	200–299	300 & over	*All firms*
Firms increasing assets							
0–24,999	—	1	4	4	1	1	11
25—99,999	—	2	2	2	—	1	7
100,000 and over ...	1	1	4	2	—	—	8
Firms decreasing assets							
0—24,999	2	—	5	—	1	—	8
25—99,999	—	1	1	2	—	1	5
100,000 and over ...	—	1	1	—	—	—	2
All Firms	3	6	17	10	2	3	41

As would be expected, most of the firms which decreased total assets decreased current assets, and most of the firms which increased total assets increased current assets. But, as is apparent from the examination of individual items, these changes in current assets do not tell the full story of changes in assets. Table XVII shows changes in current assets as percentages of the change in total assets : only 3 firms changed current assets in the opposite direction to total assets, but there is a wide dispersion among those changing current and total assets in the same direction.

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[1] *E.g.* price changes.

The creditor/debtor position

The manipulation of creditors and debtors can be an important short-term source of finance, and may be easily manoeuverable within limits, but any such movement as took place on the aggregate balance sheet (even if it reflected general behaviour) could only be an unusual and temporary change, and not a source of new finance which could be used repeatedly year after year : the firm cannot reduce debtors below zero, and there must be some upper limit to the amount which the firm can buy on credit. And it is difficult to say what is the significance of the changes. It might be true in some cases that an increase in creditors and a decrease in debtors was a source of finance used for (say) the purchase of fixed assets or stocks; but it might equally be the case that a firm had just received payment of a debt and the funds received had gone into cash—this would not necessarily be a deliberate accumulation of funds either for expansion or for the increase of liquidity. That the net change in the two items represents an accumulation of liquid capital or funds is undeniable, but whether we can treat it as a planned source of finance we cannot tell from balance sheets.

It is interesting, however, to examine the net creditor/debtor change of our 41 firms. An increase in creditors and a decrease in debtors represents a net increase in funds, or a net increase in credit received; an increase in debtors and a decrease in creditors means a net decrease in funds or a net decrease in credit received; if both are increased, the net position depends on whether creditors or debtors increased the more; and if both decreased the net result depends on which has the larger decrease.

Of the 41 firms, 20 increased their resources in this way, and 21 decreased their resources. Eight firms increased this source of finance whilst decreasing total assets, 13 firms decreased this source whilst increasing total assets. Of the total net increase, in this combined source, of £84,000, one firm had an increase of £50,000, and three firms (including the one just mentioned) increased by a total of £90,000. Thus it is not possible to detect any uniformity of experience in our firms.

Table XVIII presents the data in the form of a distribution, which demonstrates the very wide dispersion. This is due to the fact, which has been emphasised previously, that each change in the balance sheet is an integral part of the total change, which may be made up of a series of movements of various items in different directions, so that it is not realistic to examine these changes in isolation. The change in any one item might be in a different direction from the change in total assets, both for individual firms and in the aggregate, and experiences are likely to be so varied that it is difficult to generalise about the results in such a small group.

In 21 of our firms the net creditor/debtor position changed in the same

TABLE XVIII

Change in Creditor/Debtor Position as Percentage of Change in Total Assets

(*a*) *Percentage change in same direction as change in total assets*

	0–49	*50–99*	*100–149*	*150 and over*	*All firms*
Firms increasing assets ...	5	3	1	4	13
Firms decreasing assets ...	4	1	—	3	8

(*b*) *Percentage change in opposite direction to change in total assets*

	0–49	*50–99*	*100–149*	*150 and over*	*All firms*
Firms increasing assets ...	6	3	2	2	13
Firms decreasing assets ...	2	2	—	3	7

direction as the change in total assets, in the other 20 it moved in the opposite direction. Fifteen of the firms changed this item (in one direction or the other) by more than the final total change in assets. From this it is apparent how important these changes can be; but it is equally apparent that there was no uniform behaviour among our firms.

In general this analysis demonstrates how warily the economist must proceed in the examination of balance sheet data. The problem in this particular case was made worse by the very small sample, which meant that many of the proportions which seem significant when presented as part of the aggregate balance sheet turn out to be due to the behaviour of one or two firms. But in any case interpretation is not easy, and it is often difficult to distinguish in practice between *ex-post* and *ex-ante* sources of finance. On the liabilities side, for example, in the case of an increase in shares, planned and realised changes are the same when the issue is successful since an increase in shares is a deliberately planned operation. But in the case of creditors it is never possible to say whether an increase was planned or not. Similarly, on the assets side, changes in fixed assets are usually planned, but changes in debtors and cash may well not be. And the general difficulty remains that accounts are not drawn up for the benefit of research workers (there is no reason why they should be) and many accounting concepts and practices yield results which have to be interpreted with extreme caution.

These difficulties also apply to the analysis of the profit and loss Account, to which we now turn.

II. PROFIT AND LOSS ACCOUNT

By MICHAEL STEWART

There are many different ways in which firms present their current transactions. Broadly speaking, some firms have a Trading or Manufacturing Account, a Profit and Loss Account, and an Appropriation Account; others combine the Trading and Profit and Loss Accounts; others again combine the Profit and Loss and Appropriation Accounts, and quite a number of the smaller firms have only a single combined account. Even within these four categories there is a good deal of variation. Consequently, one of the main editing tasks in this Survey was to put these variously presented accounts into a standard form, which we have called the ' Profit and Loss Account '. This covers all the accounting information dealing with the firm's current costs and income.

After considering many different forms and taking into account the relative frequency of the methods actually used, we decided to employ a breakdown of our own. Primarily, what we wanted to extract were three profit categories—gross profit (profit before tax), net profit (profit after tax) and retained or ploughed-back profits—and a breakdown of costs—first into direct (or variable) and indirect (or fixed) costs, and then into subdivisions of each of these categories. Both these aims proved rather difficult. As regards profits, there is a tendency in small firms which are director-controlled[1] to pay out what are to some extent profits in the form of ' directors' remuneration ', ' directors' fees ' and so on. The Inland Revenue authorities allow small firms to treat these items, up to a point, as costs,[2] so that in these firms the gross or net profit figure is likely to be an underestimate of the true profit made (compared with firms whose shareholders are paid by way of dividends on shares held). We shall enter into the consequences of this more fully later. As regards costs, we found the breakdown into direct and indirect costs impracticable, because of the variation in the methods firms employed to present their cost structure; wages and salaries, for instance, were often grouped together, whereas it is usual to classify the former as direct, and the latter as indirect, costs. What we have done, in order to get a very rough guide to the ratios of direct and indirect costs to total costs, is to take the total of materials used[3] and wages and salaries on the one hand, and all other costs on the other.

We propose first of all to present an average Profit and Loss Account, showing the average cost categories, and the item gross profits (before tax). Then we propose to show the distribution of firms according to the more important categories. We shall also try to find out if there are any significant associations between the cost and profit margins and other important economic variables. Finally, we shall try to see how the profits are used.

Average Profit and Loss Account

Table XIX gives the average Profit and Loss Account for 39 firms.[4] Many more firms gave us some Profit and Loss Accounting information but we have only taken those firms for which we have reliable data for all the categories with which we are concerned.[1]

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[1] We have called a firm ' director-controlled ' where the directors own a majority of the (voting) shares. In a great many of our firms, particularly the smaller ones, the directors own all the shares.

[2] There is a definite figure allowed by the Inland Revenue, which varies according to the number of directors in the firm, and beyond which payment of directors may not be treated as a cost.

[3] Including fuel and power and payments to subcontractors.

[4] All these 39 firms were included in the 41 firms whose balance sheets were studied in the previous section ; there were two firms for which we had balance sheets but no satisfactory profit and loss accounts.

TABLE XIX

Average Profit and Loss Account

	£	£		£	£
Opening stock *plus* purchases *less* closing stock	41,030		Net Sales	80,841	
Payments to sub-contractors	253		Other income[2]	412	
Fuel, power, heat and lighting	1,174		*Total Income*		*81,253*
Materials used[1]		*42,457*			
Wages and Salaries	20,142				
Total direct costs		*62,599*			
Directors' remuneration and fees, etc.	2,534				
Rent and rates	321				
Depreciation	1,476				
Other costs	9,223				
Total Costs		*76,153*	*Gross profit (before tax)*		*5,100*

[1] This corresponds to the Census of Production definition, but understates to a small amount the 'true' amount of materials used (*e.g.* stationery).

[2] Does not include repayments of tax.

This table gives some idea of the average size of our firms, although of course there is considerable dispersion around the mean.[2] In Table XX we have taken each item as a percentage of (*a*) Total Costs and (*b*) Total Income (*i.e.* Total Costs plus Gross Profit).

TABLE XX

Average Profit and Loss Account

	(*a*) *Percent of Total Costs*	(*b*) *Percent of Total Income*
Materials Used	55.8	52.3
Wages and Salaries	26.5	24.8
Directors' Remuneration and Fees, etc.	3.3	3.1
Rent and Rates	0.4	0.4
Depreciation	1.9	1.8
Other Costs	12.1	11.4
Gross Profit less Loss	—	6.3
Total	100	100

Materials used comprises just over half of total income, and Wages and Salaries nearly a quarter, so that direct costs (if we take the sum of these two items as an indication of them) account for just over three-quarters of total income; 23 per cent of total income goes therefore to cover overheads and profits, or, to put it another way, the *ex-post* mark-up on direct costs is of the order of 30 per cent. (But this figure is, of course, a considerable underestimate of what economists think of as ' the mark-up on direct costs ', since our direct costs figure includes salaries.) It is possible to compare our average Profit and Loss Account with similar information published by the Inland Revenue authorities. Unfortunately they have not been producing figures for companies' costs during the last few years, and our comparison is with accounts relating approximately to the calendar year 1950.[1] The Inland Revenue give profit and loss accounts in percentage form, for an aggregate of public and private companies in a large number of industries. In Table XXI, together with a slightly altered version of Table XX, we present an average profit and loss account derived from the Report by using the same industry weights as occur in our sample; also, we have slightly altered some of the categories in order to make comparison with our own firms easier.

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[1] Table XIX does not include an average appropriation account (*i.e.* it does not show how gross profit was divided between tax, dividends and retained profits), because for 13 of the firms, the relevant information was missing or inadequate. But this does not concern us at the moment.

[2] For distribution of firms by Net Sales, see previous article: BULLETIN, August 1955, Table XV, p. 262.

TABLE XXI

Comparison between Survey Firms and Inland Revenue Firms

	Survey firms	*Inland Revenue firms*
Materials Used	52.3	59.3
Wages, Salaries and Directors' Remuneration	27.9	23.5
Depreciation	1.8	2.2
Other Costs	11.8	3.9
Gross Profit less Loss	6.3	10.9
Total Income	100	100

The great discrepancy in the ' Other Costs ' category in this Table is due to the fact that the Commissioners have included such items as the cost of transport, and repairs to plant and buildings in a ' cost of materials ' category (our ' Materials Used ') and various kinds of employers' expenses in the ' Wages and Salaries ' category. Proper comparability, therefore, would lessen the gap between the two figures for Materials Used, but would increase it for Wages, Salaries and Directors' Remuneration. Much of the latter gap, however, is due to the tendency among small firms, referred to earlier, to pay out profits in the form of directors' remuneration; and this of course accounts, in part at any rate, for the gap between the Gross Profit categories. Thus, although this Table does not indicate anything very startling, it is perhaps reassuring to know that the figures for our firms are not wildly different from those for a nationwide aggregate of public and private companies.

Distributions

Table XXII gives the distribution, for our firms, of Materials Used and Wages and Salaries as a proportion of Total Income—both separately, and combined.

On the whole these distributions are what one might expect. It perhaps seems rather odd that less than a fifth of a manufacturing firm's income should go on the purchase of materials, but closer inspection reveals that one of the

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[1] *Ninety-sixth Report of the Commissioners of Inland Revenue*, 1953. Cmd. 9030.

TABLE XXII

Materials Used and Wages and Salaries as Percent of Total Income

Percentage of Total Income	*Materials Used*	*Wages and Salaries*	*Materials Used and Wages and Salaries*
10—19	2	6	—
20—29	4	10	—
30—39	7	13	—
40—49	13	4	—
50—59	8	3	—
60—69	2	3	6
70—79	2	—	22
80—89	1	—	9
90—99	—	—	2
Total	39	39	39

two such firms in the Table is only on the borderline of being classified as a manufacturer, and the other is doing the kind of highly-skilled craftsman job which does not make this high labour-cost content unreasonable. Of the 3 firms whose Materials Used account for more than 70 per cent of their income, two are only just over the 70 per cent mark and the business of the third seems to contain a large element of wholesaling. In the case of Wages and Salaries, all of the six firms, for whom this item consists of 50 per cent or more of their total income, have less than 50 employees. The other point to notice in connexion with this Table is that, as one might expect, both the firms whose Materials Used *plus* Wages and Salaries accounted for more than 90 per cent of their total income made losses in this year.

The variations in the distribution of the other cost elements—Directors' Remuneration, Rent and Rates, Depreciation, and Other Costs, are also quite large. Table XXIII shows those of Directors' Remuneration, Depreciation and Gross Profit or Loss.

Breakdown by main variables

We shall now try to see whether the wide spread of these distributions can to any extent be explained by reference to other economic variables.

Table XXIV shows a breakdown by industrial classification : a detailed classification by industry is not possible because there are not enough firms in each order. Consequently we have taken our largest order, Order VIII (' Metal Goods not elsewhere specified ') separately ; Orders V (' Metal Manufacture '), VI (' Engineering, Shipbuilding and Electrical Goods '), VII (' Vehicles ') and VIII together; and all other manufacturing orders in our sample other than Orders V to VIII.

The most obvious difference that emerges from this Table is that whereas Materials Used account for less than half of total income for Orders V—VIII, and just over half for Order VIII alone, it is almost two-thirds for firms in all other orders. This does not seem unreasonable, in view of the high value added in many metal-using firms. The total ' direct costs ' (Materials Used plus Wages and Salaries) are very much the same for all three groups. In

TABLE XXIII

(a) Directors' Remuneration as Percent of Total Income	No. of Firms	(b) Depreciation as Percent of Total Income	No. of Firms	(c) Gross Profit or Loss as Percent of Total Income		No. of Firms
0.0— 1.9[1]	11	0.0—0.4	2	*Loss*	5.9— 4.0	1
2.0— 3.9	4	0.5—0.9	10		3.9— 2.0	2
4.0— 5.9	6	1.0—1.4	11		1.9— 0.0	2
6.0— 7.9	5	1.5—1.9	4	*Profit*	0.0— 1.9	8
8.0— 9.9	5	2.0—2.4	6		2.0— 3.9	6
10.0—11.9	3	2.5—2.9	2		4.0— 5.9	2
12.0—13.9	2	3.0—3.9	1		6.0— 7.9	5
14.0—15.9	1	4.0—4.9	1		8.0— 9.9	4
16.0—17.9	1	5.0—5.9	–		10.0—11.9	4
18.0—19.9	1	6.0—6.9	1		12.0—13.9	5
		7.0—7.9	1			
	39		39			39

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[1] Eight of these firms paid no directors' remuneration.

TABLE XXIV

Profit and Loss Accounts by Standard Industrial Classification Orders

	S.I.C. Order VIII (16 Firms)		S.I.C. Orders V, VI, VII, and VIII (27 Firms)		Total Other S.I.C. Orders (12 Firms)	
	% of Total Costs	% of Total Income	% of Total Costs	% of Total Income	% of Total Costs	% of Total Income
Materials Used...	56.3	53.2	50.2	46.8	65.9	62.4
Wages and Salaries	26.7	25.3	31.8	29.6	16.7	15.8
Directors' Remuneration and Fees, etc. ...	2.6	2.5	3.2	3.0	3.6	3.4
Rent and Rates	0.6	0.5	0.5	0.5	0.2	0.2
Depreciation	2.1	2.0	1.9	1.8	2.0	1.9
Other Costs	11.8	11.1	12.4	11.6	11.5	10.9
Gross Profit less Loss	—	5.4	—	6.8	—	5.4
Total	100	100	100	100	100	100

the case of Directors' Remuneration, the figure for both Order VIII and Orders V—VIII would be much closer to that for all the other Orders but for the fact that of the 8 firms which did not pay out Directors' Remuneration, 7 are in Order VIII. There does not seem to be any significant reason for this—two of the firms in question are partnerships, one is a sole owner, and one is not director-controlled. The difference between the figures for Rent and Rates for Orders VIII and V—VIII on the one hand, and the remaining Orders on the other, is explained by the fact that only one firm out of the twelve in the latter category rents its land and buildings, as compared with nearly half of the firms in each of the other two categories.

The only other noticeable difference in Table VIII lies in the Gross Profit less Loss category. The reason for the high profit margin in Orders V—VIII compared with the two other groups is not so much that there was a smaller proportion of firms making losses in the group Orders V—VII, nor that profit margins in this group are exceptionally high, but chiefly that the four firms in Orders V—VII which had a profit-margin of more than 10 per cent carried a big weight in the calculation : the profit made by these four firms represents 51 per cent of the profit made by the 23 profit-making firms in Orders V—VIII, instead of 17 per cent as it would if all firms carried equal weight.

In Table XXV we break down the aggregate Profit and Loss Account by three size groups. Four of the categories show substantial differences—Directors' Remuneration, Rent and Rates, Depreciation and Gross Profit less Loss. Rent and Rates is once again quite easily accounted for, since the proportion of firms which own their land and buildings is an increasing function of size : indeed, all of the six firms employing 100 people and over own their land and buildings. In the case of Depreciation, there is a tendency for larger firms to set aside a rather bigger proportion of their income for depreciation (partly explained, no doubt, by the correlation between size and ownership of land and buildings), but there is of course considerable variation : for example, the only two firms which set aside more than 4½ per cent of their income in this way (one set aside more than 6 per cent, the other nearly 7½ per cent), both have less than 50 employees.

The figures in Table XXV for Gross Profit less Loss increase with size, but all five of our firms which made losses in 1953 have less than fifty employees. If we exclude these loss-making firms the figure for gross profit as a percentage of total income, for firms with less than 50 employees, moves up from 2.88 to 4.22. This is a more appropriate figure for our present purposes. However, the figure still increases with size of firm, while that for Directors' Remuneration falls, the two movements being not unconnected. As we pointed out earlier,[1] smaller firms tend to pay out in the form of directors' remuneration or fees money that bigger firms pay out in the form of dividends on shares held. That is, part of what our directors (particularly in the smaller firms), receive in the form of directors' remuneration etc.,

[1] Page 167.

TABLE XXV

Profit and Loss Accounts by Size

	Under 50 Total Employment (23 Firms)		*50–99 Total Employment (10 Firms)*		*100 and over Total Employment (6 Firms)*	
	% of Total Costs	*% of Total Income*	*% of Total Costs*	*% of Total Income*	*% of Total Costs*	*% of Total Income*
Materials Used	54.9	53.3	51.6	48.2	58.3	54.1
Wages and Salaries	25.7	24.9	29.6	27.6	25.1	23.2
Directors' Remuneration and Fees, etc. ...	6.1	6.0	4.7	4.4	1.5	1.4
Rent and Rates	0.9	0.9	0.5	0.4	0.2	0.2
Depreciation	1.3	1.3	1.8	1.6	2.3	2.1
Other Costs	11.1	10.8	11.9	11.1	12.6	11.7
Gross Profit less Loss	—	2.9	—	6.7	—	7.3
Total	100	100	100	100	100	100

must be considered as profit paid to them in their capacity as *shareholders*. Consequently one would expect some tendency, within our size range, for Gross Profit to be an increasing, and Directors' Remuneration a decreasing function of size. We are not suggesting that this is the whole explanation of the movement of these two categories in Table XXV. To some extent, for instance, directors are a fixed cost, the average of which declines with size (increasing output), and this and other economies of scale may lead to larger gross profit margins in the bigger firms; our analysis of efficiency and productivity, however, does not lend much support to this theory. In Tables XXVI and XXVII we show the dispersion, by size, of Directors' Remuneration and Gross Profit or Loss. Both tables show that the variation is greater, the smaller the firm.

Retained Profits

We must now consider the rather complicated problem of retained profits. If one assumes (and in most cases it will be a fairly accurate assumption[1]) that the total tax figure in the profit-and-loss account is the tax that will have to be paid out on that year's profits, and therefore defines the proportion of profit retained as $\frac{\text{actual profits after tax, minus dividends,}}{\text{actual profits after tax}}$ one gets an exaggerated figure for the proportion of profit retained, since for many of our firms some part of the directors' remuneration paid out[2] should really have been added to the category ' actual profits after tax ', and subtracted with the dividends. In Table XXVIII(*a*) we show the distribution of actual retained profits as a percentage of actual profits after tax. It can be seen that by this measure the proportions of profits retained are very high, and on the whole it is in the smallest firms that they are highest of all. (See Table XXIX(*a*).

In order to obtain a better idea of the proportion of profits *really* retained in the business, one would like, ideally, to impute a salary to the directors in our firms, and thus find out how much of their remuneration must be considered as profits, as distinct from genuine salary. Unfortunately, one cannot do this with any confidence that one is not being led widely astray. The best practical thing to do seems to be to argue *ab extremis*, and assume that *all* of the directors' remuneration for our firms is a profit. If one adds back

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[1] The tax problem is a rather difficult one. It seems to be fairly standard practice for firms to put down in the profit-and-loss account an estimate of the tax due to be paid on this year's trading. (In fact many of our firms explicitly state that this is what the tax figure represents.) In the case of a few of our firms the tax information was impossible to interpret and, more often, the appropriation account was missing and the categories in the balance sheet too condensed for it to be possible to derive the information from there. These firms have been omitted from the present calculations. A rough check on the accuracy of our assumptions here is provided by the fact that when for another purpose (see p. 176) we were considering data external to our firms (*i.e.* rates of income and profits tax) in order to impute a rate of tax, we decided that 50 per cent (of gross profit) was the best rough-and-ready estimate to make. The actual tax figure that emerges from our calculations, for the aggregate of firms, is 52.3 per cent. (See table XXX).

[2] Not all of it, because much of directors' remuneration represents a genuine wage-cost ; our directors are usually doing what in bigger firms would be done by salaried managers.

TABLE XXVI

Directors' Remuneration by Size of Firm

Percentage of Total Income	*Total Employment*		
	Under 50	*50–99*	*100 and over*
0.0— 1.9	5	3	3
2.0— 3.9	2	—	2
4.0— 5.9	3	2	1
6.0— 7.9	3	2	—
8.0— 9.9	3	2	—
10.0—11.9	2	1	—
12.0—13.9	2	—	—
14.0—15.9	1	—	—
16.0—17.9	1	—	—
18.0—19.9	1	—	—
Total	23	10	6

Note.—Eight firms did not pay out directors' remuneration; five of them had less than 50 employees, one of them 50–99 employees, and two of them 100 employees or more.

TABLE XXVII

Gross Profit or Loss by Size of Firm

Gross Profit/Loss as % of Total Income	*Total Employment*		
	Under 50	*50–99*	*100 and over*
Loss 5.9— 4.0 ...	1	—	—
3.9— 2.0 ...	2	—	—
1.9— 0.0 ...	2	—	—
Profit 0.0— 1.9 ...	7	1	—
2.0— 3.9 ...	3	1	2
4.0— 5.9 ...	1	1	—
6.0— 7.9 ...	2	3	—
8.0— 9.9 ...	2	—	2
10.0—11.9 ...	1	2	1
12.0—13.9 ...	2	2	1
Total	23	10	6

TABLE XXVIII

Proportions of Profits Retained

Percentage of profit retained	(*a*) *Actual retained profit as % of actual profits after tax*	(*b*) *Actual retained profit as % of net imputed profit*
10 and under	—	2
20 ,, ,, ...	—	—
30 ,, ,, ...	—	4
40 ,, ,, ...	—	2
50 ,, ,, ...	1	3
60 ,, ,, ...	—	2
70 ,, ,, ...	2	3
80 ,, ,, ...	4	2
90 ,, ,, ...	5	1
100 ,, ,, ...	8	—
Over 100		1
Total[1]	20	20

[1] We are reduced to twenty firms here, since in addition to the reason given in fn. 1, p. 174, six of our firms have a negative figure for retained profits—either because they initially made a loss, or because it became one after payment of tax. We are ignoring these firms for the moment, since discussion of retained profits necessarily pre-supposes that there were initially profits that could be retained, and since we are not at the moment seeking draw any aggregative conclusions.

Table XXIX

Proportions of Profits Retained by Size of Firm

Percentage of profit retained	*(a) Actual retained profit as % of actual profits after tax*			*(b) Actual retained profit as % of net imputed profit*		
	Under 50	50–99	100 and over	Under 50	50–99	100 and over
10 and under	—	—	—	1	1	—
20 " "	—	—	—	—	—	—
30 " "	—	—	—	3	1	—
40 " "	—	—	—	—	1	1
50 " "	—	—	1	1	2	—
60 " "	—	—	—	—	—	2
70 " "	1	1	—	—	1	2
80 " "	—	2	2	2	—	—
90 " "	—	3	2	—	1	—
100 " "	6	2	—	—	—	—
Over 100				—	1	—

Note. In Tables XVIII*a* and XXIX*a*, all eight of the firms in the '100 and under' category retained all their actual profits after tax.

directors' remuneration to profits before tax, and then (because, of course, the actual tax figure is no longer of any use) imputes what seems to be the best, rough, rate of tax of 50 per cent, one gets a figure which we have called 'net imputed profit'. This is the best estimate we can make of what our firms would have had left, after tax, to distribute as dividends or retain in the business, on the assumption (*a*) that all directors' remuneration is a profit and (*b*) that they are now distributing profits in the same way as public companies (*i.e.* by way of dividends). If we then take actual retained profit as a percentage of net imputed profit,[1] we get an estimate of the proportion of profit retained in the business.[2] The distribution of actual retained profit as a percentage of net imputed profit is shown in Table XXVIII(*b*). By this measure, of course, the *proportions* of profits ploughed back are considerably smaller—and there is a slight tendency for them to be smaller, the smaller the firm. As the above discussion shows, Table XXIX(*a*) overestimates the proportion of profits that our firms retain, and Table XXIX(*b*) underestimates it.[3] Just where between the two the truth lies one cannot tell, but it is probably closer to (*a*) than to (*b*). However, we cannot definitely say whether the proportion of their profits that our firms really retain varies with their size. But when we compare the appropriation accounts of our firms, in aggregate, with the quarterly statements of the profit and loss accounts of public companies published by *The Economist*,[1] something rather more conclusive seems to emerge. In Table XXX(*a*) we show how the gross profit (before tax) for the aggregate of our 26 firms[2] for which we have the information, breaks down into tax, dividends or drawings, and retained profits. It can be seen that though the tax paid out by our firms is nearly as much as for the large public companies dealt with by *The Economist*, dividends or drawings are considerably smaller—and retained profits, in consequence, considerably larger. In order to eliminate the effect of directors' remuneration on these figures we assume, as before, that for our firms *all* directors' remuneration is not a cost but a profit. In Table XXX(*b*) therefore we show the breakdown for our firms,[3] of what we have called ' total profit ' (gross profit before tax plus directors' remuneration before tax). By our earlier assumption, 50 per cent of this figure goes in tax, in which case our firms retain 24.7 per cent of their total profit (before tax) or 49.4 per cent of their profits after tax, compared with the 25.6 per cent of gross or total profit, and 55.4 per cent of profits after tax, retained by *The Economist* firms.[4] When one remembers that by assuming that *all* directors' remuneration for our firms is profit, we are to some unknown but considerable extent underestimating the

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[1] We do not change the actual *amount* retained in the business—this is the one stable element in the calculation; we are trying to arrive at some reasonable figure, as a percentage of which the amount retained in the business can be expressed.

[2] By this method of paying out profits, only about half the directors' remuneration *actually* paid out would be paid out in addition to dividends. (Strictly, rather more or less than half according to whether the actual tax paid represented less or more than half of gross profits.) In fact, of course, because of the large salary element in directors' remuneration, the pay of our directors would not be reduced nearly as much as our method of argument implies; if we knew for certain, for instance, that only a third of directors' remuneration was profit, then their pay would only be reduced by a sixth by this calculation—or less if they originally received dividends as well as remuneration.

[3] Because by assuming that *all* directors' remuneration is a profit we have artificially increased the denominator of what would be a 'true' retained profits fraction without correspondingly increasing the numerator.

TABLE XXX

Tax and Profit Breakdowns: Survey Firms and Economist Firms

(*a*) *Percentage of gross profit (before tax)*	*Aggregate of 26 small businesses*	*Aggregate of 2781 public companies*
Total tax	52.3	53.8
Dividends or drawings ...	11.6	20.6
Retained profit	36.1	25.6
Gross profit	100	100
(*b*) *Percentage of total profit (gross profit before tax plus directors' remuneration before tax)*		
Total tax	50.0	53.8
Dividends or drawings ...	25.3	20.6
Retained profit	24.7	25.6
Total profit	100	100

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[1] *The Economist*, July 17th, 1954, p. 214.

[2] The six loss-making firms are included in this calculation.

[3] We do not do this breakdown for *The Economist* firms, of course, because we are not suggesting that in these large public companies directors' remuneration is anything other than a genuine salary element.

[4] The proportion of profits after tax that our firms retain in the business depends, of course, in this calculation, on the rate at which one imputes tax. But in order to argue that the proportion of profits retained that we have given is substantially too high, one would have to argue that we have imputed tax at much too high a rate, and there seems to be no justification for this. Indeed, if anything, one might want to increase the tax paid by our firms up to the level (53.8 per cent of gross or total profits) paid by *The Economist* firms, in which case the proportion of profits that our firms retain in the business would increase.

proportion of ' true ' profits that our firms retain, it can be seen that our firms may well plough back a greater proportion of their net profits than do public companies.[1] If, for example, one were to assume that two-thirds of the directors' remuneration paid out by our firms was a genuine salary, and only one-third a profit (an assumption which probably still exaggerates the profit element), the proportion of net profit retained by our firms would move up from 49.4 per cent to 62.5 per cent. It seems reasonable to say then, that our firms retain at least as large, and probably a rather larger, proportion of their true net profits than do bigger companies. We have far too few firms to be able to say whether this is representative of small businesses as a whole, but for various reasons—such as greater difficulty, compared with big firms, in getting finance from other sources, and a great distrust of anything that might lead to outside control—our conclusion may well be valid.

The commentators on material gathered from a pilot survey are in danger of falling between two stools. They realise that the data cannot be taken as representative, and so hesitate to draw general conclusions; but on the other hand they realise that mere presentation of facts without hypotheses, and without any attempt at some sort of explanation and generalisation, contributes little to business economics, and tells us little about the possibilities of survey data on a larger scale.

A pilot survey is necessarily experimental, and can only provide illustrations of the potentialities of survey information for research purposes. This article and the previous one have given some indication of the use to which survey information can be put, but they have by no means exhausted the possibilities. Several other topics, such as productivity comparisons and investment behaviour were investigated but abandoned after a time, partly because the sample was too small, and partly because the material itself proved inadequate or insufficiently detailed. But even the abandoned investigations have served useful purposes because in conjunction with the other attempts at interpreting the survey material, they point to weaknesses in the method or ambiguities in the answers which can be avoided or prevented in planning a larger survey.

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[1] Of course, our aggregate will contain a larger proportion of loss-making firms than *The Economist*'s. But in practice this makes little difference. If we exclude our six loss-making firms from this calculation the proportion of net profit our firms retain becomes 48.7 per cent.

CAPITAL INTENSITY OF INDUSTRIES

A Comparative Study of Certain Countries

By V. V. Bhatt

In a recent article[1] we tried to compare the capital output ratios of some industries in the developed economies with the corresponding ratios for the underdeveloped economies. From this comparison it appeared that the capital output ratios of the industries of an underdeveloped economy were not significantly lower than those of the corresponding industries of at least some of the developed economies. From this result, we can say that the capital intensity—in the sense of the relative combination of capital and labour inputs—of an industry in an underdeveloped economy is more or less the same as that of the corresponding industry of a developed economy, *provided that the set of alternative combinations of inputs for any industry are identical for all countries.* However, in view of the different degrees of technical progress achieved in different countries resulting in differences in the quality of capital equipment, managerial ability and labour in various countries, this assumption regarding the sameness of the set of alternative combinations of inputs or production techniques for any industry in all countries does not seem to be justified. In short, the capital output ratio of an industry would not be a good index of its capital intensity for the purposes of international comparison. Therefore, for making an international comparison about capital intensities of industry, it is felt that a direct study of the technological conditions in the industries of the underdeveloped economies as compared with those of the corresponding industries of the developed economies ought to be made. Accordingly, in this article it is proposed to compare the nature of the plant and equipment of some of the industries of the underdeveloped economies with that of the corresponding industries of the developed economies and to discuss various factors, more or less of a technological nature, that tend to raise or lower the capital intensity of the industries of the underdeveloped economies as compared with that of the corresponding industries of the developed economies.

Nature of plant and equipment

It seems, from the available information, that the nature of direct process plant and equipment is more or less the same in the industries of the underdeveloped economies as in the corresponding industries of the developed economies, though the quality of plant and equipment in the case of the former deteriorates faster with advancing age as compared to that of the latter.

The cotton textile industry, the largest industry in India, for example, though behind the United States and Japan in technical development, is, from the technical point of view, quite comparable with the cotton textile industry in the United Kingdom.[1] 'Taken as a whole, the mills in India compare favourably as regards building construction, modern machinery and up-to-date labour saving devices with the mills in Lancashire.'[2] The firms in this industry in India have quite extensively adopted the high drafting system in spinning, high speed warping and winding machines, improved types of cheese and beam dyeing plants and universal winding machines;[3] all of these are relatively less common in the United Kingdom's industry.[4] Fifty per cent[5] of the total cotton mills in India have installed high drafting systems in spinning, which require 20 per cent less labour than the low drafting system;[6] while in the United Kingdom, only 27 per cent of the total spindles in 1936 were based on the high drafting system. In Japan they were 100 per cent and in the United States they were 99 per cent of the total spindles.[7] High speed winding and warping, which reduces labour requirements from 7 to 75 per cent according to the thoroughness of the system adopted, though fairly common in the Indian mills, was not widely adopted in the United Kingdom mills.[8] As far as automatic looms are concerned, both in India and in the United Kingdom, less than 10 per cent of the total looms were automatic in 1936.[9] In Chile, 71 per cent of the spindles and 72 per cent of the looms are entirely modern.[10] Peruvian industry has installed automatic looms which require 65 per cent[11] less labour than the non-automatic looms; about 35 per cent of its looms are automatic.[12]

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[1] V. V. Bhatt, 'Capital-output Ratios of Certain Industries : A Comparative Study of Certain Countries,' *The Review of Economics and Statistics*, August 1954, Vol. xxxvi, No. 3.

The iron and steel industry in India is one of its five largest industries.[13] The Tata Iron and Steel Company, the principal steel manufacturing company in India, has 'one of the largest and best equipped iron and steel plants in the world'.[14] Another principal producer of iron and steel in India, the Iron and Steel Company, was 'constructed after the most up-to-date American Plan and has everything in the way of labour saving devices.'[15] The average size of the blast furnace in India was 620 tons a day in 1937;[16] while, in the same year, it was 277 tons in the United Kingdom, 700 tons in the United States and 416 in Germany.[17] At present the average size is 800 tons in India;[1] while it is 666 tons in the United Kingdom,[2] 850 tons in the United States,[3] and 600 tons in Australia.[4] A larger sized blast furnace requires much less labour than a smaller sized blast furnace.[5]

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[1] Daniel H. Buchanan, *The Development of Capitalist Enterprise in India*, New York (1934), p. 203.

[2] British United Textile Factory Workers' Association, *Conditions in the Textile Industry of India* (1926), p. 4.

[3] K. Lalwani, *Industrial Efficiency in India*, Calcutta (1949), p. 90.

[4] G. C. Allen, *British Industries and Their Organization* (1951), p. 200.

[5] Private communication from the Ahmedabad Textile Industry's Research Association, Ahmedabad, India.

[6] International Labour Office, *The World Textile Industry*, Vol. I (1937), p. 305.

[7] *Ibid.*, p. 305.

[8] *Ibid.*, p. 305; and Lalwani, *op. cit.*, p. 90.

[9] International Labour Office, *op. cit.*, p. 54–55.

[10] United Nations, Department of Economic Affairs, *Labour Productivity of the Cotton Textile Industry of Five Latin American Countries, New York (1951)*, p. 3.

[11] International Labour Office, *op. cit.*, p. 305.

[12] United Nations, *op. cit.*, p. 4.

[13] Government of India, Ministry of Commerce and Industry, Directorate of Industrial Statistics, *Third Census of Manufactures*, 1948, Vol. I, p. 16.

[14] Buchanan, *op. cit.*, p. 285.

[15] *Ibid.*, p. 286.

[16] N. S. R. Sastry, *A Statistical Study of India's Industrial Development*, Bombay (1947) p. 67.

[17] Allen, *op. cit.*, p. 110.

In Chile, the output of the cement factory is 400,000 tons annually, while the average output of a cement factory is only 258,000 in the United States.[6] For copper mining in Chile, electrolytic processes are widely adopted.[7] Cigarettes are manufactured in Latin America with the help of machines rather than by the hand processes, and in the glass manufacturing industry the two largest firms in Mexico use automatic and semi-automatic machinery.[8]

The Indian Tariff Board insisted at the time of giving protection that the firms desiring protection should have reasonably up-to-date machinery as compared to the firms of the corresponding industries in the developed economies, so that they would be able to do without protection eventually. Most of the industries like cement, heavy chemicals, tinplate, sugar, paper and pulp, plywood and tea chests, magnesium chloride and aluminium, to which the Indian Tariff Board recommended granting of protection, had reasonably up-to-date machinery as compared to the corresponding industries of the developed economies.[9]

Need to import plant and equipment

That the industries of the underdeveloped economies should be using plant and equipment comparable to those of the corresponding industries of at least some of the developed economies is not at all surprising. The underdeveloped economies have hardly developed any new technology different from that of the developed economies and have hardly any equipment-manufacturing industries.[10] Therefore, they have to import the technology as well as the plant and equipment for their various industries from the developed economies, and they import whatever plant and equipment are available in the developed economies. Even in Japan, where labour is cheap relatively to other developed economies, the equipment of its industries is exactly similar to that of the comparable industries of the other developed economies.[11]

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[1] P. E. Mehta, *Iron and Steel Industry in India* in *Metal Progress*, October (1951), p. 93.

[2] Allen, *op. cit.*, p. 110.

[3] United Nations, Department of Economic Affairs, *World Iron Ore Resources and Their Utilization, New York* (1950), p. 37.

[4] *The Times Review of Industry*, June (1952), Australia.

[5] United Nations, Department of Economic Affairs, *World Iron Ore Resources*, p. 39–40.

[6] *Ibid., Economic Survey of Latin America*, 1949, New York (1951), p. 364.

[7] *Ibid.*, p. 382.

[8] George Wythe, *Industry in Latin America*, New York (1945), pp. 21, 24 and 306.

[9] Indian Tariff Board, *Cement Industry Evidence* (1924), pp. 25, 93, 114, 186, 237, 242, 251.
Ibid., Report on Heavy Chemical Industry (1929), pp. 11, 19, 30.
Ibid., Report on Steel Industry (1924), p. 123.
Ibid., Report on Paper and Pulp Industries (1925), p. 79.
Ibid., Report on Magnesium Chloride Industry (1938), p. 41.
Ibid., Report on Aluminium Industry (1944), p. 17.
M. P. Gandhi, *The Indian Sugar Industry* (1937), p. 2.

[10] Govt. of India, *Report of the Fiscal Commission*, 1949–50, Delhi (1950), p. 33.

[11] G. C. Allen, *Japanese Industry: Its Organization and Development to 1937*, Chapters 16, 17, 19, in *The Industrialization of Japan and Manchukuo, 1930–1940*, edited by E. B. Schumpeter, New York (1940).

High cost of imported skilled labour

There is one other consideration also which induces the industries in underdeveloped economies to adopt some of the labour-saving processes common in the corresponding industries of the developed economies. In the initial stages, they have to import skilled labour from the developed economies and their wages are much higher in the underdeveloped economies than they are in the developed economies.

The Tata Iron and Steel Company in India, for example, had all European workers when it started its operations, and their wages were 50 per cent above what they were in Europe.[1] Similarly, skilled labour was imported by some of the firms in other industries like cement, paper, tinplate, etc.[2]

Efficiency wages

The insistence on labour saving modern equipment in the industries of the underdeveloped economies is also understandable when we look at the composition of the labour force in an underdeveloped economy. Unskilled labour is undoubtedly abundant but they suffer from an acute shortage of skilled labour.[3] Moreover, though the wages are low in an underdeveloped economy as compared to a developed economy, the efficiency wages are not so low. The industries in an underdeveloped economy have to use much more labour than the corresponding industries of the developed economies for similar operations. The following Table will give us an idea as to the efficiency wages in the cotton textile industry in India.

Of course, these figures are not strictly comparable because of wide differences in administrative and manufacturing practices in different countries. However, they do indicate that the efficiency wages in India are not as low as may be expected from the prevailing wages per man-hour.

In the Iron and Steel industry in India, for some tasks, it is necessary to employ three times the number of workers that would be usually employed in the United States.[4]

TABLE IA

Operatives Engaged in Spinning Yarn up to 40 Counts Ring Spindles: Last Half of 1932

Country	*Weekly wages per worker*	*Wages per 1000 spindles*	*Weekly wage bill per unit of output*
	In yens, at prevailing exchange rates)		
China	3.7	8.9	11.8
Japan	5.8	6.1	13.2
United Kingdom ...	29.2	4	50.8
United States	84	3.4	119
Germany	30.8	4.5	60.3
India	9.07	15	56.7

Source: International Labour Office, *The World Textile Industry*, Geneva (1937), p. 208.

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[1] Indian Tariff Board, *Steel Industry, Evidence*, Vol. I, (1924), pp. 332, 223–224.

[2] *Ibid.*, Vol. II (1924), p. 63 ; *Ibid.*, *Cement Industry, Evidence* (1924), pp. 24–25 ; *Ibid.* (1925), p. 297 ; *Ibid.*, *Paper and Pulp Industries, Evidence* (1924), pp. 112, 160, 200, 323.

[3] S. A. Mosk, *Industrial Revolution in Mexico*, Los Angeles (1950), Chap. 13. United Nations, Department of Economic Affairs, *Economic Survey of Asia and the Far East, 1950*, New York (1951), pp. 76–78.

[4] Buchanan, *op. cit.*, p. 290.

TABLE IB

Wage Costs in the Weaving Industry

Firm and country	*Looms*	*Number of operatives*	*Total wages bill per day in rupees*	*Wages per 100 looms per day in rupees*
Cotton Mill, Japan	840	175	334.21	39.78
Bombay Standard, India ...	840	465	920.37	109.56
Manchester Mill, U. Kingdom...	800	318	680.78	85.09

Source: P. S. Loknathan, *Industrial Organization in India*, London (1935), p. 357.

'. . . far more men are employed in iron and steel works in India than would be considered necessary in the western countries.'[1] In 1924 the labour costs per ton of finished steel were higher in India than in other developed economies.[2]

In the jute industry, '. . . in India in an average mill, the manufacture of a ton of jute yarn on spools absorbs not less than 300 to 350 man-hours; whereas in London 90 man-hours are required with modern machinery and on the continent they are as low as 50 man-hours.'[3]

Similarly, in other industries in India also, larger numbers of workers are employed than in the corresponding industries of the developed economies for similar operations.[4] The Welsh Plate and Sheet Manufacturers' Association in their representation to Tariff Board (1926) stated that the total number of employees for a mill equipment similar to the India Tinplate Company, operating three shifts and producing 36,000 tons annually, would be between 710 and 720, whereas actually there were employed in India 2734 employees.[5] The ratio of efficiency of an Indian worker to the efficiency of a worker in a developed economy has been put at 1 : 2.8 to 1 : 3.6.[6]

Even the purely unskilled worker in India is not as efficient as his counterpart in the developed economies. 'For the operation of an electric crane, one man is sufficient in America against three in India'. '. . . three men are required to drive a riveting machine (in India) which would be handled by one man in America.'[7]

Use of unskilled labour

What is abundant in the underdeveloped economies is the untrained unskilled labour. The cost per man-hour of this labour is very low in underdeveloped economies as compared to that in the developed economies. In mechanical engineering industries in 1939, for example, cost per man-hour of this labour was 0*s*. 1.1*d*. in India, 1*s*. 0.77*d*. in the United Kingdom and 1*s*. 10*d*. in Australia.[8] Even assuming that the efficiency of a man-hour in India, is one third that of the United Kingdom and Australia, still the efficiency wages of this labour would be considerably lower in India than in the United Kingdom and Australia. Hence we find that the industries in underdeveloped economies try to use unskilled labour in place of capital equipment in a variety of ways.

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[1] Indian Tariff Board, *Report on Steel Industry* (1924), p. 33.

[2] *Ibid.*, p. 33.

[3] Lalwani, *op. cit.*, p. 21.

[4] Indian Tariff Board, *The Paper and Pulp Industries, Evidence* (1925), p. 75; *Ibid.*, *Report on Cement Industry* (1925), p. 5.

[5] P. S. Loknathan, *Indusrtrial Organization in India*, London (1935), p. 361.

[6] *Ibid.*, p. 361.

[7] Buchanan, *op. cit.*, pp. 364, 367.

[8] *International Labour Review*, 'Statistics', March (1939).

The substitution of capital by labour

(*i*) *Materials handling* The substitution of capital by labour, though not very common in the basic technical processes, is fairly common in certain auxiliary operations of the various industries in the underdeveloped economies. The most important of these operations seems to be materials-handling.

In coal mining in India, 'mechanical appliances for screening and loading coal are used to a small extent and mechanization of underground mining operations has not made much progress.'[1] ' In many open pits coal is carried hundreds of yards up steep grades on women's heads. . . . In 1929 not a single mechanical conveyor was working underground in India though England had 100 in 1907 and 2100 in 1928.'[2] In Chile, similarly, there is little mechanization in coal mining.[3]

In the cotton textile industry in India, most of the handling and carrying of materials inside as well as outside the plant is done by human labour. Unskilled labour is also used for cleaning the plant and equipment, cleaning toilet blocks, supply of drinking water, etc.[4] In the iron and steel industry in India, unskilled labour is used for excavations, loading and unloading of raw materials and earth generally; only in handling materials in very large quantities has mechanization proved profitable.[5] In the paper and pulp industry in India, loading bamboo chips in digesters, carrying lime to causticizers, putting black ash in the smelter furnace, etc.—for all these operations manual labour is used;[6] pulp is transferred from boilers (digesters) by hand to ' breakers ', while in an up-to-date European mill, no separate breaker equipment is required; the digester is directly connected with the ' washer ' by a pipe.[7] In the sugar industry in India, unloading of canes from bullock carts, conveyors and railway wagons, as the case may be, bagging sugar, removing the bags from the drying place to the godown and loading wagons for dispatch—all these are done by manual labour.[8] In the cement industry in India, the use of unskilled labour is fairly common for the quarrying of limestone, transporting of clay, loading and unloading of coal, gypsum and cement, packing of cement,[9] etc.

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[1] P. J. Thomas, *India's Basic Industries, Bombay* (1948), p. 79.

[2] Buchanan, *op. cit.*, p. 261.

[3] United Nations, Department of Economic Affairs, *Economic Survey of Latin America, 1949*, New York (1951) p. 348.

[4] Private communication from Lalbhai Sons and Company, Ahmedabad, India ; *ibid.*, Calico Mills, Ahmedabad, India ; *ibid.*, The Ahmedabad Textile Industry's Research Association.

[5] Private communication from the Tata Iron and Steel Company, India ; *ibid.*, the Mysore Iron and Steel Works, India.

[6] Private communication from the Titaghar Paper Mills, Calcutta, India.

[7] India Tariff Board, *Report on Paper and Pulp Industries* (1925), p. 7.

[8] Radhakamal Mukerjee, *The Indian Working Class*, Bombay (1945), p. 62.

[9] Indian Tariff Board, *Cement Industry, Evidence* (1924), p. 21.

Handling of materials in the industries of the developed economies and especially in the United States has now been greatly mechanised. Between 1920–34, more than half of the labour saving changes made in the industries of the United States were in the handling of materials rather than in the processing of operations.[1] These labour saving innovations in materials-handling resulted in a labour saving of 20 to 90 per cent, as compared to the previous methods, depending upon the handling operations.[2] The aggregate reduction in the number of workers in 31 instances of labour saving innovations in materials-handling in the United States was 75 per cent as compared to the former practices.[3]

The following figures of the workers engaged in materials-handling as a percentage of the total workers in an industry in the United States clearly show the importance of this operation in industry.[4]

Industry	*Number of workers engaged in materials-handling as a percentage of the total number of workers in industry*
1. Auto body	4.7
2. Tyre and tube...	16.5
3. Steel foundry	21.6
4. Machine shop	11.4
5. Hosiery	3.5
6. All the five industries • ...	8.7

For the majority of the departments of the brick plants surveyed by Jerome, the proportion of handling costs to total payroll costs varied from 10 to 40 per cent.[5]

The lack of mechanization in materials-handling in the industries of the underdeveloped economies will tend to lower their capital coefficients as compared to those of the corresponding industries in the developed economies. Because of the non-availabliity of the necessary information, it is not possible to give in quantitative terms the effect of this lack of mechanization on the capital coefficients of the industries of the underdeveloped economies. However, in the iron and steel industry for which materials-handling is quite an important operation, the cost of materials-handling equipment is estimated to be 9 per cent of the total value of plant and equipment for the Standard Blast Furnace Method, 15 per cent for the Electric Smelting Furnace Method, and 16 per cent for the Sponge Iron Furnace Method.[6] If we take these percentages as representative of most of the industry, it appears that the capital coefficients of the industries of the underdeveloped economies would be lower than those of the corresponding industries of the developed economies by about 9 to 16 per cent, assuming, of course, that the other conditions were identical in both cases.

[1] H. Jerome, *Mechanisation in Industry*, New York (1934), pp. 188–189.

[2] *Ibid.*, pp. 193–197. [3] *Ibid.*, p. 394. [4] *Ibid.*, p. 183. [5] *Ibid.*, p. 187.

[6] United Nations, Department of Economic Affairs, *World Iron Ore Resources and Their Utilization*, New York (1950), pp. 53–54.

(*ii*) *Auxiliary technical processes.* Apart from materials-handling operations, it seems that certain other auxiliary technical processes, for which unskilled labour could be effectively used, are also less mechanised in the industries of the underdeveloped economies than in the corresponding industries of the developed economies.

In the cotton textile industry in India, the processes connected with the winding, warping and drawing of yarn, the examination of cloth as it comes out of the weaving shed, the piling of the unbleached cloth at the various stages of bleaching are all only partially mechanised.[1]

' Labour saving equipment, such as the simple hand knotter which ties knots more quickly and more smoothly than can be done by hand, is not widely used in India. Drawing-in of warps is almost always done by the tedious hand methods rather than by the machine method employed in the United States and Japan.'[2] The piling as well as the folding of cloth at various stages is done by hand processes.

But then it seems that the situation in the cotton textile industry of the United Kingdom also is not much different. According to the *Report of the Cotton Textile Mission to the United States*, the British labour requirements exceed the American by 22 to 98 per cent in spinning, by 381 to 571 per cent in winding, by 366 to 786 per cent in beaming and by 129 to 203 per cent in weaving.[3] For 100 operatives needed in the United States to produce a given quantity of roving in Card Room Processes, 263 were needed in the United Kingdom.[4]

In the paper and pulp industry in India, grass and rags to be used for the manufacture of chemical pulp are cleaned by hand, whereas in Europe they are cleaned by machines.[5]

' It is one of the peculiarities of the match manufacture that with the possible exception of peeling of wood for splints and veneers, all the other processes, of which there are many, can be performed either by hand or almost entirely by machinery.'[6] In India, barring a few firms which are fully mechanised, operations like box wrapping, box filling, packetting, labelling, side painting, dipping and parafinning, outer and inner box pasting, etc., are performed by hand processes to a varying degree in all the other firms of the match industry.[7] The capitalisation per gross of match boxes in the completely mechanised firms was twice that of the partially mechanised firms. However, it may be noted that the production costs per gross of match boxes was lower and the quality of the product superior in the former firms than in the latter.[8] This was because of the enormous labour saving made possible by the use of the simplex process by the fully mechanized firms; for the same amount of output, this process required only three workers while the partially mechanized processes required sixty-eight.[1]

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[1] Private communication from the Lalbhai Sons and Company, Ahmedabad, India.

[2] Buchanan, *op. cit.*, p. 205.

[3] M. P. Gandhi, *The Indian Cotton Textile Industry* (*1944 Annual*), June (1945), Bombay, p. 55.

[4] G. C. Allen, *British Industries and Their Organization* (1951), p. 221.

[5] Indian Tariff Board, *Report on Paper and Pulp Industries* (1925), p. 7.

[6] *Ibid.*, *Report on Match Industry* (1928), p. 20.

[7] *Ibid.*, pp. 7, 20 ; *ibid.*, *Match Industry, Evidence* (1928), pp. 42, 46–50.

[8] *Ibid.*, *Report on Match Industry* (1938), pp. 39, 40, 150, 160.

(*iii*) *Technical processes* In the glass industry in India, bottles, phials, globes, chimneys, etc., were manufactured both by hand processes as well as by semi-automatic machinery.[2] The ratio of value of fixed capital to the gross value of annual output for the firms using semi-automatic machinery was twice as high as that of the firms using hand processes. However, the production cost per ton of finished glass was 28 per cent higher for the hand processes than for the machine processes.[3] The Indian Tariff Board had strongly recommended the use of automatic or semi-automatic machinery by the firms using hand processes so that they might be able to reduce their production costs and improve the quality of their product.[4] In Mexico, apart from the two largest glass factories which use automatic machinery, the remaining 25 glass factories use hand processes.[5] In other Latin American countries automatic and semi-automatic machinery have been used in glass factories since 1920.[6]

In the vegetable oil industry in India, some factories use modern expellers while some others use the oil-ghanis, operated with the help of animal power and human labour. However, the production cost per unit of output was 5 to 10 per cent higher in the case of the latter than in the case of the former and the quality of the product was also inferior.[7]

In copper mining industry in Chile, some large scale firms use electrolytic processes while some medium scale firms do not use them. However, the production cost per unit of output was 40 per cent higher in the latter than in the former. The latter also required 150 per cent more labour per unit of output than the former.[8]

Thus it will be seen that some firms in certain industries do use hand processes in technical processes also; but these firms have higher production costs per unit of output than other firms using machine processes. It seems that, in certain industries, hand processes persist simply because of the non-availability of capital and that they would soon be given up since they are no longer profitable as compared to the other machine processes.

(*iv*) *Use of antiquated plant and equipment* In some industries of the underdeveloped economies, the original plant and equipment are used for a much longer time, and hence become technically obsolete at a much later date, than in the corresponding industries of the developed economies.

[1] *Ibid.*, *Report on Match Industry, Evidence* (1928), p. 645.

[2] *Ibid.*, *Report on Glass Industry* (1932), pp. 9–11; Thomas, *op. cit.*, p. 335.

[3] Indian Tariff Board, *op. cit.*, pp. 76, 74–75, 84.

[4] *Ibid.*, pp. 92, 100.

[5] George Wythe, *Industry in Latin America*, New York (1945), p. 306.

[6] *Ibid.*, p. 24.

[7] Thomas, *op. cit.*, pp. 283–285; National Planning Committee, *Rural and Cottage Industries*, Bombay (1945), pp. 68–69.

[8] United Nations, Department of Economic Affairs, *Economic Survey of Latin America, 1949*, New York (1951), pp. 381–382.

This use of old machinery in the cotton textile industry of some of the Latin American countries increases labour consumption per kilogram of fabric by about 23 per cent in the spinning mills, 164 per cent in the weaving mills and 106 per cent on average for both sectors of the industry. Moreover, the machinery is worked at more than normal speed and its period of inactivity is reduced to a minimum.[1]

Factors tending to lower the capital-labour ratio and to raise the capital-output ratio

Undermaintenance of plant and equipment, defective manufacturing conditions and deficiencies in the methods of technical and administrative control in some industries of the underdeveloped economies tend to lower their capital intensity but at the same time tend to raise their capital coefficients as compared to the corresponding industries of the developed economies.

(*i*) *Undermaintenance of plant and equipment* Undermaintenance of plant and equipment seems to be fairly common in some industries of the underdeveloped economies. For example, the physical condition of the equipment of the cotton textile industry in some of the Latin American countries is very deficient in the majority of mills not only because of the physical deterioration caused by many years of constant use but also because of the lack of an adequate maintenance service. Hence stoppages and breakdowns of the machines are common and result in the lower efficiency of the processes and the use of more labour.[2]

(*ii*) *Defective manufacturing conditions* Defective manufacturing conditions are fairly common in the cotton textile industry of Latin America, resulting in 15 to 20 per cent more labour consumption. The machine and room layout is poor; the central systems of humidity are deficient or nonexistent; no proper attention is paid to cleanliness in the rooms and the machinery, and no efficient tools and equipment are used for this purpose; the quality of yarn is poor; the products of popular consumption are not standardised; and no attention is paid to the training of labour.[2] The conditions in the various other industries of the underdeveloped economies are more or less similar.

(*iii*) *Deficiencies in the methods of technical and administrative control* With a view to avoiding extra overhead costs by the use of more labour, some of the industries of the underdeveloped economies have not introduced the methods of technical and administrative control evolved in the developed economies. For example, in the Latin American cotton textile industry, the various methods of technical and administrative control such as rational methods of determining the work loads, systems of quality control, control of efficiency of processes, systems of cost control, and methods of controlling the wastage of raw material, are conspicuous by their absence. Hence there

[1] United Nations, *op. cit.*, pp. 6–9.

[2] United Nations, *op. cit.*, pp. 7–9.

is no compelling need for the costly services of well trained managers. All these deficiencies in the methods of technical and administrative control result in the employment of about 81 per cent of superfluous labour in the old mills and about 37 per cent in the modern mills.[1] More or less the same conditions exist in most of the Indian industries.[2]

Factors tending to raise the capital-labour as well as the capital-output ratio

The resort to mechanisation as a result of shortage of skilled labour, and the existence of firms of an uneconomic size because of scarcity of capital and the narrowness of the markets for their products, tend to raise the capital-labour as well as the capital-output ratio in some industries of the under-developed economies.

(*i*) *Mechanisation* In the spinning section of the cotton textile industry, for example, the mule spindles have the capacity to manufacture high grades of yarn by processes in which labour skill counts heavily; while the ring spindles have the capacity to manufacture low or medium grades of yarn by a highly mechanical technique, requiring much less use of skilled labour. In 1937, less than 70 per cent of the total spindles were ring spindles in the United Kingdom, Germany and Switzerland; while more than 95 per cent in Brazil, China, Japan, Mexico, and the United States, and more than 85 per cent in India and Canada, of the total spindles were ring spindles.[3]

(*ii*) *Uneconomic sizes of firms* In 1931 in Bombay, 19 per cent of the cotton spinning mills were below the optimum size of 30,000 to 40,000 spindles and 54 per cent of the cotton weaving mills were below the optimum size of 1,000 looms, as fixed by the Indian Tariff Board.[4] In Ahmedabad, 59 per cent of the cotton weaving mills in 1931 were below the optimum size of 600 looms, as fixed by the Indian Tariff Board.[5] For Latin America, the optimum size of a cotton spinning and weaving mill is 25,000 to 50,000 spindles and 500 to 1000 looms; while the general average size is only 9,600 spindles and 230 looms.[6]

Likewise in India, 40 per cent of the sugar mills in 1938,[7] 50 per cent of the paper mills in 1950,[8] 82 per cent of the match manufacturing firms in 1928,[9] 82 per cent of the heavy chemical plants[10] and 66 per cent of the firms in the plywood and tea chest industry in 1927,[11] were below their respective optimum sizes. In the coal mining industry in India, 'a large part of the second class coal is raised by uneconomic units;'[12] 44 per cent of the coal fields in 1938 had an annual output of less than 10,000 tons.[13]

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[1] United Nations, *op. cit.*, pp. 8–10.

[2] Loknathan *op. cit.* Chap. 9; Lalwani *op. cit.* p. 45; Private communication from the Ahmedabad Textile Industry's Research Association.

[3] International Labour Office, *op. cit.*, pp. 50–51.

[4] Sastry, *op. cit.*, p. 52.

[5] *Ibid.*, p. 52.

[6] United Nations, *op. cit.*, pp. 2, 6.

[7] Indian Tariff Board, *Report on Sugar Industry* (1938), pp. 60–61.

[8] Government of India, *Report of the Fiscal Commission, op. cit.*, p. 63.

[9] Indian Tariff Board, *Report on Match Industry* (1938), pp. 5, 21, 134–136.

[10] *Ibid., Report on Heavy Chemical Industry* (1929), pp. 16, 19, 30.

[11] *Ibid., Report on Plywood and Tea Chest Industry* (1927), p. 22.

[12] Sastry, *op. cit.*, p. 74.

[13] *Ibid.*, p. 76.

Extra cost of plant and equipment

Since the underdeveloped economies have to import their plant and equipment from the developed economies, they have to incur, over and above the factor cost of the plant and equipment, additional expenditure on freight and insurance charges, commissions, landing and transport charges, import duty and extra costs of erection. The following table gives the percentage difference between the cost of plant and equipment in the country of their manufacture and their actual cost to the Indian industries.

TABLE II

Extra Cost of Importing Plant and Equipment of Indian Industries as Percentage of Their Actual Cost in the Countries from which They are Imported

Industry	
1. Cement	20
2. Iron and steel	17 to 40
3. Locomotive manufacturing ...	35
4. Paper and pulp	20 to 33
5. Sugar	19
6. Matches	15
7. Cotton textiles	29
8. *Chemicals	30

* Not for the Indian Industry.

Sources : Indian Tariff Board, *Cement Industry, Evidence* (1924),p. 53.
Ibid., Steel Industry, Evidence, Vol. I (1924), pp. 216–217.
Ibid., Vol. II (1924), p. 289.
Ibid., Vol. III (1924), p. 173.
Ibid., Report on Steel Industry, 1924, p. 46.
Ibid., Paper and Pulp Industries, Evidence, pp. 291–292 (1924).
Ibid., Vol. I (1938), pp. 56–57.
Ibid., Report on Paper and Pulp Industries (1925), p. 78.
Ibid., Report on Sugar Industry (1933), p. 116.
Ibid., Report on Match Industry (1928), pp. 152–153.
Lokanathan, *Industrial Organization in India,* London (1935), pp. 129–130.
Private communication from the Calico Mills, Ahmedabad, India.
Ibid., The Ahmedabad Textile Industry's Research Association, Ahmedabad, India.
Ibid., E. R. Squibb and Sons, New Brunswick, New Jersey.

It will be seen from this table that the extra cost of importing plant and equipment ranges from 15 to 40 per cent of their cost in the country of their manufacture, depending upon the type of plant and equipment. This factor alone would tend to raise the capital coefficients of the industries of the underdeveloped economies by 15 to 40 per cent above those of the corresponding industries of the developed economies, assuming that they were otherwise equal.

Summary and conclusions

Regarding the technology and the capital intensity of the industries of the underdeveloped economies as compared to those of the corresponding industries of the developed economies, it is difficult to venture any firm conclusions on the basis of the meagre and fragmentary information that we have been able to collect; a detailed and extensive comparative study of the industries of both types of economies seems to be necessary for that purpose. However, certain facts stand out prominently even from the scanty data that were available to us.

The underdeveloped economies, it seems, have not been able to develop a new technology suited to their own economic conditions. The old handicraft technology has been found to be uneconomic in most cases and quite unsuitable in some other cases. The industries of the underdeveloped economies import not only the technology but also the capital goods necessary for that purpose from the developed economies. From the input combinations of the handicraft technology to the input combinations of the modern technology of the developed economies constitutes a big jump and because of the lack of development of any intermediate technology, the industries of the underdeveloped economies face a sharply discontinuous production function, which is continuous only within the ranges permitted by the handicraft technology on the one hand, and the technology of the developed economies on the other. And even within the range of input combinations possibilities permitted by the technology of the developed economies, in some cases the industries of the underdeveloped economies are induced to adopt labour-saving input combinations, partly because some industries in these economies have to import highly costly skilled labour from abroad and partly because of the fact that the efficiency wages there are not as low as may be expected from their cost per man-hour figures. This low efficiency of labour itself, however, reflects itself in greater employment of labour for identical processes in the underdeveloped economies as compared to the developed economies.

On the other hand, the abundance of cheap unskilled labour and the non-availability of capital on reasonable terms and in sufficient quantity to most of the firms of the different industries are reflected in the following facts about the industrial structure of the underdeveloped economies.

(1) Cheap unskilled labour is used in place of capital equipment in most cases for materials-handling and also in some cases in the auxiliary technical processes. In some other cases, even uneconomic technical processes are adopted.

(2) In some cases the plant and equipment used are technically antiquated and obsolete, which leads to greater use of labour.

(3) Equipment is not properly maintained and expenditure on the improvement of manufacturing conditions and the methods of technical and administrative control is avoided; more labour is employed instead in most of the cases.

(4) Increased mechanization is adopted in some cases as a result of shortage of skilled labour.

(5) The size of individual firm is smaller than the optimum in several industries.

All the first three factors tend to lower the capital intensity of the industries of the underdeveloped economies as compared to that of the corresponding industries of the developed economies. The effect of the last two factors is probably to raise the capital intensity of the industries of the underdeveloped economies.

Regarding the capital coefficients of the industries in the underdeveloped economies, the first two factors would tend to lower them, while the last three factors would tend to raise them, as compared to those of the corresponding industries of the developed economies. Further, the necessity to import capital equipment from abroad and the extra expenditure incurred in importing them tend to raise their capital coefficients by about 15 to 40 per cent depending upon the nature of the industry (*i.e.* by about 25 or 30 per cent on average) as compared to those of the equipment exporting economies. If we make a reasonable guess and assume that the effect of the five factors mentioned above would be, on balance, to lower the capital coefficients of the industries of the underdeveloped economies by about 25 per cent on average as compared to the capital coefficients of the corresponding industries of the developed economies from whom they import their plant and equipment, we might expect that, taking all the factors into consideration, the capital coefficients would be on average about the same in both developed and underdeveloped economies. The conclusion reached in my article referred to earlier is thus substantiated by the data given in this article.

Thus, although the capital coefficients of the industries of the underdeveloped economies are not significantly lower than those of the corresponding industries of the developed economies, their capital intensity is considerably lower than that of the corresponding industries of the developed economies.

Appendix

Trend towards mechanization

Since the end of World War II, there seems to be a definite trend in most of the industries in India towards increased mechanization as a result of a fall in interest rates, an increase in real wages and increased upward pressure on real wages because of government legislation and the growing strength of the trade union movement.

The average annual percentage yields on long-term government bonds fell from 3.56 in 1939 to 2.79 in 1946 and 2.86 in 1947; the annual percentage rate of discount on 3 months treasury bills fell from 2.03 in 1939 to 0.43 in 1946 and 0.44 in 1947.[1] The index of real wages rose from 100 in 1939–40 to 120 in 1946–47; while the index of real profits fell from 100 in 1939–40 to 82.3 in 1946.[2] The ratio of total annual wage costs to total annual industrial income increased from 0.31 in 1939–40 to 0.38 in 1946–47.[3] In the Tata Iron and Steel Company the ratio of annual wage and salary costs to the total annual costs rose from 0.25 in 1945–46 to 0.35 in 1946–47.[4] In the Calico mills, Ahmedabad, the same ratio rose from 0.24 in 1939 to 0.27 in

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[1] United Nations, Department of Economic Affairs, *Statistical Year Book*, 1948, New York (1951).

[2] *Eastern Economist*, December 31 (1948), Delhi, pp. 1124, 1125, 1127.

[3] *Ibid.*, December 17 (1948), p. 1062.

[4] *Ibid.*, December 31 (1948), p. 1127.

1949.[1] The wages of unskilled workers rose relatively more than the wages of the skilled workers: the ratio of daily wages of a skilled worker to the daily wages of an unskilled worker in the cotton textile industry fell from 2.62 in 1939 to 1.82 in 1950;[2] in the Tata Iron and Steel Company, this ratio fell from 8.6 in 1939 to 3.1 in 1950.[3]

In 1937–38, the percentage of trade union membership to the total industrial population in large scale factories was hardly 20; in 1945, it rose to 33.[4]

The Government of India passed the Minimum Wages Act in 1948 and is now taking measures to promote fair wages, welfare work and the social security scheme;[5] all these will tend to raise the expenditure of the various industries on labour. In Latin American countries also, laws regarding minimum wages have been passed.[6]

Because of all these reasons, ' an immediate mechanization is thought to be the best solution of the economic problems in the iron and steel industry' of India.[7] There is a definite trend towards increased mechanization in the Indian textile industry also.[8] The Calico Mill, Ahmedabad, for example, reduced its ratio of annual wage and salary costs to the annual gross value of output from 0.27 in 1949 to 0.17 in 1951 and 0.15 in 1952 by means of rationalization.[9]

This trend towards increased mechanization and highly capital-intensive methods of production is clearly seen in some of the industries which have developed in the post-war period in the underdeveloped economies.

The factory manufacturing textile machinery in India, ' will house some 750 of the latest machine tools and the most modern mechanical foundry in the East;'[10] there are going to be no hand processes even in the auxiliary operations.[11] The factory manufacturing automatic looms in India is ' an up-to-date factory making textile weaving machinery. The Gwalior factory is equipped with fully mechanized foundry and a modern machine tool plant.'[12] In the chemical industry in India, the Atul Products, Limited, Bulsar, has tried to save labour as much as possible and has introduced most of the automatic labour saving devices in materials-handling also.[13] The new petroleum refinery plant recently started in Bombay is going to be ' the plant of the most advanced design in the world and will incorporate the very latest technical features, the oil industry has developed . . . there would be no large variation in the ratio of the net value of plant and equipment to the gross annual value of output between India and the United States.'[1]

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[1] Private communication from the Calico Mills, Ahmedabad.

[2] *Ibid.*, from the Ahmedabad Textile Industry's Research Association, Ahmedabad.

[3] *Ibid.*, from the Tata Iron and Steel Company, India.

[4] Sastry, *op. cit.*, pp. 150, 183.

[5] United Nations, Department of Economic Affairs, *Economic Survey of Asia and the Far East, 1950*, New York (1951), pp. 84–85, 92–97.

[6] Wythe, *op. cit.*; pp. 57, 58.

[7] Mehta, *op. cit.*, p. 96.

[8] Private communication from the Ahmedabad Textile Industry's Research Association, Ahmedabad.

[9] *Ibid.*, from the Calico Mills, Ahmedabad.

[10] *The Indian Textile Journal*, October (1951), Bombay, p. 333.

[11] Private communication from the National Machinery Manufacturers, Ltd., Thana, India.

[12] *The Indian Textile Journal*, February (1952), Bombay, p. 280.

[13] Private communication from the Atul Products, Ltd., Bulsar, India.

The Volta Redonda Steel Plant, started in 1946 in Brazil, is a modern integrated steel plant comprising a blast furnace with a capacity of 1,200 tons a day and proportionate coke oven and coke by-product plants, open hearth furnace, a blooming and slabbing mill, a structural mill, a universal plate mill and a sheet mill.[2] In Chile also, a modern steel plant is under construction.[3] In Mexico, the paper production plant, Atenquique Plant, started in 1945 has a pulp capacity of 35,000 to 40,000 tons a year and is using up-to-date electrolytic processes for two chemicals.[4] In the Cement Plant, started after the war in Mexico, the machinery is the most modern and up-to-date.[5]

Bombay.

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[1] *Ibid.*, from the Standard Vacuum Oil Company, New York.

[2] United Nations, Department of Economic Affairs, *World Iron Ore Resources and Their Utilization*, 1950, New York, p. 20.

[3] *Ibid.*, p. 21.

[4] Mosk, *op. cit.*, p. 164.

[5] United Nations, Department of Economic Affairs, *Economic Survey of Latin America*, 1949, New York (1951), p. 425.

A 'HUMAN NEEDS' DIET: SPRING 1956

by T. Schulz

This survey of the cost of a 'human needs' diet was undertaken in April 1956. It was carried out in the same way as the previous surveys in this bi-annual series,[1] and the figure of cost computed again represents the weekly expenditure for a family of 5 persons—husband, wife, and three children of school age. In the autumn of 1955, the cost of such a diet was found to amount to 68s. 8½d. ; in April 1956, it had increased to 71s. 11½d.

Four main factors contributed to this rise in cost: first, there was the seasonal rise in the price of fresh milk (and also a slight rise in the price of imported Cheddar cheese) ; secondly, there was an incresae in the price of bread, from 7½d. to 8½d. for the standard loaf of 1¾ lb., resulting from the reduction in the bread subsidy ; thirdly and fourthly, there was a shortage of potatoes and fresh vegetables, owing to the severe winter, which made these foods expensive and required their partial substitution by other foods. Some of the rise in cost thus occasioned was offset by the seasonal decline in the price of eggs and a slight decline in the price of lard.

The complete dietary is set out in Table I. It is essentially similar to the dietary for the autumn of 1955, except for a smaller allowance of potatoes and cabbage and an increased allowance of macaroni (or rice) and dried legumes. It would obviously have been unreasonable to assume the same relatively high consumption of potatoes and cabbage in the spring of 1956 as in the autumn of 1955—when these foods were still plentiful—since the high prices prevailing in April 1956 acted not only as a natural but, indeed, as an essential check on their consumption. The cheapest 'substitute' foods would have been bread and flour, at a total cost of between 8d. and 9d. less than the substitutes actually selected for our dietary ; but on the assumption that the family eats two cooked meals a day, and considering the dietary habits in the Midlands, it appeared more likely that a housewife would try to make good a shortage of potatoes and fresh vegetables by an increased use of macaroni, rice, and dried legumes.

The dietary in Table I would yield nearly the same nutritional intake as the corresponding dietary for the autumn of 1955. It is nutritionally satisfactory in every respect, even though the safety margin which it offers of vitamin C may be lower than that provided by the autumn dietary.[2] Conversely, the spring dietary would give the family a slightly increased intake of vegetable protein, since dried legumes contain more protein in relation to their calorific value than do potatoes and fresh vegetables.

Table II compares the relative cost of the five food groups of the dietary in Table I, and their relative calorific values and protein content, in the autumn of 1955 and the spring of 1956. It will be seen that the partial replacement of potatoes and fresh vegetables by other foods would have entailed only slight alterations in the general pattern of nutritional intake.

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[1] *Cf. A 'Human Needs' Diet: Autum* 1955. Bulletin, Vol. 18, No. 1.

[2] Unless the dried legumes are allowed to sprout before cooking.

TABLE I

Weekly 'Human Needs' Diet for 5 Persons—Spring 1956

	Quantity	Average Price per Unit[1]	*Changes since Autumn 1955*	
			Quantity	*Outlay*
		s. d.		*s. d.*
(*A*) Animal Protein Foods :				
Meat	4 ℔	2 9	...	...
Bacon	12 oz.	3 0	...	...
Herrings, fresh and cured	1 ℔ 8 oz.	1 0	...	...
Eggs	8 eggs	3½	...	— *8*
Cheese	1 ℔ 12 oz.	2 8	...	+ *3½*
Milk, ordinary	16 pt.	7½	...	+ *8*
do., condensed skimmed	2 tins[2]	10½	...	...
School milk	5 pt.	free	...	...
Outlay on Group (*A*)		*33 6*		+ *3½*
(*B*) Fats :				
Margarine	2 ℔ 4 oz.	1 4	...	...
Other Fats[3]	1 ℔	1 4	...	— *1*
Outlay on Group (*B*)		*4 4*		— *1*
(*C*) Potatoes and Vegetables :				
Potatoes	14 ℔	5	*—7 ℔*	+ *7*
Onions	8 oz.	9	*—1 ℔*	— *0¼*
Other Root Vegetables[4]	7 ℔	5		
Greens	2 ℔	9		
Dried Legunes[5]	3 ℔ 8 oz.	10½	*+1 ℔*	*+1 0½*
Outlay on Group (*C*)		*13 8¼*		*+1 7¼*
(*D*) Cereal Foods :				
Bread	19 ℔ 4 oz.	8½	...	+ *11*
Flour	3 ℔	1 5	...	...
Rolled Oats	3 ℔ 8oz.	10	...	...
Other Cereals[6]	1 ℔ 10 oz.	10½	+ *8 oz.*	+ *6¼*
Outlay on Group (*D*)		*12 8½*		*+1 5¼*
(*E*) Other Foods :				
Sugar...	3 ℔	8	...	...
Tea	8 oz.	4 4	...	...
Various	*[7]	3 *6¾*	...	...
Outlay on Group (*E*)		*7 8¾*		...
Total Outlay		**71 11½**		**+3 3**

[1] The price unit is : eggs, one egg ; milk, ordinary and school, pint ; milk, condensed skimmed, tin ; bread, 1¾ ℔ loaf ; flour, 3 ℔ bag; 'various,' total outlay ; all other foods, ℔.

[2] Equivalent to approximately 3¾ pints of skimmed fresh milk and 11 oz. of sugar.

[3] Lard, suet, dripping.

[4] 3½ ℔ carrots, 3½ ℔ swedes, turnips, parsnips.

[5] Lentils, haricot beans, peas.

[6] Macaroni, small grain rice, semolina, barley.

[7] 4 oz. cocoa, 8 oz. syrup, 8 oz. dried figs or stoned dates, condiments.

TABLE II

'Human Needs' Diet, Autumn 1955 and Spring 1956: Outlay, Calories and Protein

	Outlay		Calories		Protein animal		Protein, veget.	
	Autumn 1955	Spring 1956	Autumn 1955	Spring 1956	Autumn 1955	Spring 1956	Autumn 1955	Spring 1956
	%	%	%	%	%	%	%	%
(*A*) *excluding school milk*	48.4	46.6	22.6	22.6	100.0	100.0	—	—
(*B*)	6.4	6.0	15.1	15.1	—	—	—	—
(*C*)	17.6	19.0	12.2	11.1	—	—	29.6	30.4
(*D*)	16.4	17.7	41.5	42.6	—	—	68.6	67.8
(*E*) *excluding tea and condiments*	5.9	5.6	8.6	8.6	—	—	1.8	1.8
(*E*)Tea and Condiments	5.3	5.1	—	—	—	—	—	—
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Changes in Dietary from Autumn 1955 to Spring 1956 ... ... *Autumn 1955 = 100%*		+4½%		0		0		+ 4%

pp 199-200 deleted, advertising